

# Photon



Issue 5

Oct/Nov 2004

<http://www.photonezine.com>

**What Can You See in a  
Telescope?**

**Meade ETX90-EC Review**

**Ancient Astronomers of  
Newgrange**

**Saturn Observation Campaign**

**Celestron: The Early Years**

**I Gave Myself a Present for  
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## Editorial

Welcome to the fifth issue of **Photon**, the new bi-monthly astronomy magazine which aims to fill the gap left by the regular printed magazines.

My thanks go to all the contributors who took the time to send in material and photos for this issue.

### Call for Submissions

With the next issue looming, as ever, I'm on the lookout for material for that issue. Anything related to amateur astronomy is welcome.

I thought the majority of astronomy societies who download/read this ezine would jump at the chance for a bit of free publicity by writing articles describing your societies and what you get up to. Maybe this note will prompt a response! 😊

As now seems par for the course where I live, the October lunar eclipse was clouded out. It is now, literally, years since I've seen one as the elements always seem to conspire whenever there's an astronomical "event" to behold.

The same thing happened with the recent auroral activity. It appears that the storm was somewhat spectacular, evidenced by a couple of reports from people in my neck of the woods who saw it through clouds. Not a break in the clouds, but the aurora was so bright that it's light could be seen through the clouds.

I know what this is like having been up in Iceland last year where the aurora is a regular occurrence. Ghostly light permeates the clouds, filtering down to the watchers below. You know there's an aurora up there, you know it's bright and extensive but all you see is a

pale hint of the activity swirling across the sky above the clouds.

Icelandic amateur astronomers virtually curse the aurora because it interferes with everything else except Moon watching!

However, I was lucky enough to catch the aurora on a previous trip there. Despite the interference of a full moon high in the night sky, the ephemeral curtain of green streamers wafted gently across the sky, billowing as if touched by a soft summer breeze. (I'm told there was pink and red as well but my colour-blindness prevented me from seeing them!) The display lasted over an hour and I never thought of taking a picture! If you managed to witness the recent auroral storm, why not send in an account of it or some pictures.

As I write this, Comet Machholz Q2 is in our skies. By mid November, it had reached to mag. 6.5. It is projected to reach to mag. 4, high in the evening sky in December and January. In the Northern Hemisphere, it remains observable for a long time, being visible until October 2005 when it becomes as faint as mag. 14. You'll find for info on the comet at:

<http://ephemeris.sjaa.net/0410/b.html>

Maybe some of you will send in images or drawings of the comet over the coming months?

A nova has also been discovered in Puppis that is currently of magnitude +7. For more information, visit: <http://www.astronomynow.com/alerts.shtml#nova>

I hope you enjoy Issue 5.

**Gary Nugent**

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## Did you Know?

### Comet Plague

In 1664, Czar Dmitri was allegedly told that a comet seen over Russia portended a plague in autumn, albeit one less dangerous to Russia than to other countries. Dmitri promptly set up a sanitary cordon at his borders and banned foreign ships in general (and English ships in particular) from entering Russian ports.

While this part of the story may be apocryphal, Russia did in fact escape the Great Plague which ravaged the rest of Europe in 1666.

### Comet

As Jules Mazarin (1602-1661) French Cardinal and statesman, protege of Cardinal Richelieu, adviser to Anne of Austria (Louis XIV's mother), tutor and chief minister to Louis XIV lay dying, the sky was lit by a comet which superstitious observers believed would herald the passing away of a great statesman. Mazarin was soon told of the fateful prediction. "The comet," he remarked, "does me too much honor."

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# What Can I See in a Telescope?

By Don Waid

The [Hubble Space Telescope](#) has displayed to the world the beauty of celestial objects. The images published by the Hubble team are viewed on television, published in magazines and books, and displayed on the Internet. Awareness of Space and its mysterious and beautiful objects has never been higher. Many aspiring amateur astronomers would very much like to see these wonders through their own telescope but have very little knowledge of just what their views through moderate sized, and priced, telescopes will look like. They ask

questions such as, "How much can I see looking through the telescope?" "Will I be able to see those beautiful galaxies and nebulas?" "What will they really look like?" "Can I see the colors like those in the photographs displayed in magazines?" In this article I will endeavor to answer some of these questions.

First of all, do not expect to see celestial objects as they are displayed in most photographs. These images are usually acquired with very long exposures utilizing

sensitive CCD cameras and much more sophisticated equipment than what is within the reach of most amateur astronomers. This is not to say beautiful views are not possible to see in moderate amateur equipment. They definitely are possible. Many are thrilled (myself included) at the wonderful vistas enjoyed through amateur telescopes.

Just how much can one expect to see looking through a moderate, say 6 to 10-inch, reflecting telescope? Will a nebula be just a fuzzy cloud or will it display form and structure? Will a galaxy have detail or be just a fuzzy patch in the eyepiece? How about the Moon and planets?

The answer to these questions depends on several factors. Some have to do with the telescope being used, the environment one observes from, and the object being observed. Let's explore a few of these factors.

## Sky Conditions

Dark skies are very important to visual observation. This is not to say a person cannot do visual observation from badly light polluted skies. I have two observing locations; one in a very light polluted suburban location, and one in a small rural community with relatively dark skies. The difference in observations between the two is primarily in the ability to discern faint details. At the risk of becoming too technical, if the background light pollution (sky glow) is the same magnitude as, or greater than, the faint details of the object being observed, then there is no contrast between the background and those faint details. They will not stand out above the background and will not be visible. Rule of thumb, the darker the skies the fainter the objects that can be observed. Many of the objects in the heavens are very bright. The Moon is an excellent example. Many devote all their attention to just lunar observa-



*Observation Site: View Looking East*

*This picture was taken at 1:00 AM. It is looking east from my backyard observing site. The only illumination is the light pollution present at my suburban location. It was taken with a hand held digital camera and is not a time exposure.*

*The pollution consists primarily of low pressure sodium illumination but there is a component of mercury vapor illumination as well. This can be seen on the right portion of the image above. That glow is coming from a parking lot. In spite of the very bad light pollution, I am able to perform usable telescopic observations and imaging.*



Gibbous Moon

Date: 09-16-2002 Telescope: LX200GPS-12U Camera: Sony Mavica F90

*Gibbous Moon*

*The definition of Gibbous as pertaining to the Moon or planets is:*

*More than half but less than fully illuminated.*

*This applies to the image above. The full Moon appears very flat when viewed through telescopes. The full illumination of the moon by the Sun produces very few shadows and therefore the features, such as craters or mountains, do not stand out in relief. Phases of less than full reveal more of the Moon's surface features. Possibly the most pleasing images of the Moon are viewed during the first or last quarter phase.*

tion. The Moon is very bright and light pollution is not a factor. Excellent images of the Moon are easily made with a common digital camera held up to the telescope eyepiece. Lunar observations may be undertaken using small inexpensive refractors or with expensive large aperture reflectors. Other objects that break through the light pollution barrier are the planets. Venus, Jupiter and Saturn are all very bright. Mars, when its orbit brings it close to Earth every two years, is also very bright. These objects are best viewed with high magnifications. Small medium-focal-length refractors using short focal length eyepieces are very adequate for planetary observation.

Light pollution is only one sky condition factor to consider at your viewing location. Such things as humidity, transparency and atmospheric turbulence come into play. High humidity can be more than a nuisance causing one to get wet walking across a dew covered lawn for the morning newspaper. During the evening while observing in humid conditions this same dew forming on the grass also has a nasty habit of forming on the telescope. The lens "fogs" and until it is removed, your telescope is out of commission. Dew prevention heater strips and other products are available as telescopic accessories, and they work quite well. An alternative to these is the use of a handheld hair drier. When the lens of my telescope fogs, a short application of low heat from the hair drier clears it up quickly. Atmospheric transparency can also be a problem. A cloud-covered sky is obvious, but a thin layer of "haze" sometimes is not. If the Moon is up, and you notice a bright extended halo around it, the transparency is not good. Other local conditions such as smoke and dust can affect the transparency. Turbulence in the atmosphere can cause problems with what astronomers refer to as "seeing". This is what makes the stars "twinkle". It is also bad for telescopic observations. At higher

magnifications, the view in the eyepiece will shimmer and sharp images will be difficult to achieve.

Many of these sky conditions cannot be avoided by the amateur astronomer, but they can be tolerated. Less than optimum sky conditions should not prevent one from exploring amateur astronomy.

### Telescope Aperture

Telescope aperture is important, but sometimes overemphasized. The eye is small and the amount of light it gathers serves us well for our daily life but not so for viewing anything but the brightest stars. We augment our eyes with the use of our telescopes. The larger the aperture, the more photons of light are gathered and sent to our eyes. (More photons, more detail, fainter objects.) I had an eight-inch SCT (Schmidt Cassegrain Telescope) that had very good optics. I then purchased a big 12-inch SCT and thought the heavens would suddenly "open up". Quite frankly, I was disappointed when I looked through the "Big Scope". The difference was there, but it was not like night and day. The bigger scope's display was somewhat brighter and, because of the longer focal length (~ 3000 mm vs. 2000 mm), objects were larger.

Many amateur astronomers get "aperture fever", an uncontrollable desire for the largest diameter telescope available. One should avoid this pitfall. I know, I have been a victim! My 12-inch SCT is an example. In my opinion, a good starting point is the 6 to 8 inch reflecting telescope or a 5 to 6 inch achromatic refracting



*A typical 6-inch reflector*

telescope. Many of these are available from different vendors. Browse the advertisements in any reputable amateur astronomy magazine or publication and compare their products and prices. Avoid buying what we in amateur astronomy refer to as "Department Store Telescopes". These are the telescopes, usually very low in price, displayed with very pretty color images of planets, galaxies and nebulae on the boxes and boasting about how much they can magnify objects. In most cases these are cheaply made with inferior optics and will be of little or no use to anyone interested in exploring the hobby of amateur astronomy.

### Observational Skills

Observational skills are important. You must develop good observational skills to fully ap-

preciate the benefits of any scope you are using. Learning to use such skills as "averted vision" and techniques involving moving the telescope slightly to take advantage of the human eye's ability to detect motion are very important for visual observation. An astronomy professor teaching a beginning astronomy course reported that at the start of the course he takes his students to the observatory. He then has them look at a faint object, such as a dim nebula, and asks them what they see.

They usually say they see just some stars and nothing else. At the end of the course, after teaching observational skills, he asks them to view the same object and report what they see. They then, if they have been good students, report much more detail, faint areas of nebulosity and subtle differences in brightness of the stars in the field of view. Good observational skills must be learned and are essential to the appreciation of the wonders available to the observer. This is probably the most important aspect of successfully pursuing amateur astronomy.

### Enhancement Filters

Eyepiece filters can help bring out details of some nebulae and other deep sky objects by increasing the background contrast and suppressing light pollution wavelengths. They do help, but there is a price to pay. Any filter blocks light in order to perform its job. Blocked light means fewer photons and dimmer objects. A larger aperture scope with a light pollution filter will have a higher contrasting background (darker sky) but now delivers fewer photons to the eye.



*A typical 4-inch refractor*

Roughly speaking, a 12 inch scope with a good light pollution suppression filter in the suburbs would perform like a smaller, say 6 to 8 inch, scope in a rural, moderately dark sky, location. There are many different types of filters. They include different colored filters to enhance planetary views, light pollution suppression filters to cut sky glow, neutral density lunar filters to cut down the glare of the bright Moon, hydrogen beta filters for certain types of nebula viewing and on and on. My advice to those

new to amateur astronomy is to avoid using these filters until after basic skills are mastered. The only exception would be the neutral density lunar filter. The Moon can be uncomfortably bright when viewed through a telescope.

### Viewing Expectations

In the discussion above, I touched on what can be expected when viewing the Moon and planets, even in light polluted urban skies with very moderate amateur telescopes. These alone are more than enough to spend many an enjoyable evening with your telescope. I never get enough of viewing the craters, mountains and plains of the moon. Subtle features such as lunar domes and rilles are exciting to tease out of the eyepiece. Saturn, with its rings, is one of the beauties of our solar system. Jupiter with its Galilean moons and distinct cloud bands is a wonder to observe. Mars with its icecaps and its ruddy hue is a spectacular sight. It is one of the few objects that will display color in amateur telescopes.

Many wish to go farther than the solar system objects mentioned above. What can one expect to see while observing "Deep Sky Objects"? The answer to this is difficult because it depends on the factors discussed in the beginning of the article. I will try to generalize somewhat and relate my experiences observing deep sky objects.

### Star Clusters

Star clusters come in two forms. Open clusters consist of loosely bound stars in a wide and usually irregular



*A typical selection of colored observation filters*

gathering. Globular star clusters consist of hundreds of thousands of stars, tightly bound, as in a ball.

They are almost like little spherical galaxies but are really part of our own Milky Way Galaxy. Both types of clusters are easily viewed with amateur telescopes. These clusters can be very beautiful to observe. Open clusters remind me of diamonds spread out on jewel salesman's black velvet cloth. M13, the great globular in Hercules, looks like a fuzzy ball with a speckling of ever thinning stars extending out from its bright center.

### Nebulae and Galaxies

What one can expect to see when viewing nebulae from a moderately dark sky depends on the brightness of the nebula. The Orion nebula surrounding the trapezium stars stands out very well even in a small telescope, or even large binoculars. It is a very nice object to observe. It is a hit when showing off your telescope to non-astronomical friends. It's almost as good as the Moon! What you will not see is the dim outer portions of the nebula. With moderate sized telescopes (6 to 10 inch reflectors) you will be able to discern the brighter portions of some nebulae. The Ring Nebula, M57, is a favorite. It will look like a small "smoke ring". I have never been able to see the two stars in the center of it even with my 12-inch telescope located in my light polluted suburban location. Even from that location the nebula itself stands out remarkably well and is fascinating to observe. Other brighter nebulae are easily visible from all but the worst light polluted skies using moderate aperture scopes. M27, M16, M17, and others are good visual objects. You will be able to discern the

bright parts of the nebula and even some shape detail, but not the faint portions you see in photographs. What you do see is thrilling nonetheless.

Viewing galaxies is much the same as nebulae. The same optical and viewing considerations apply. Galaxies, especially face-on spirals, are spread out and their surface brightness is very low. The Triangulum Galaxy, M33, is a good example. I cannot see it visually from my suburban location even in my 12-inch telescope. It simply is swamped by the sky glow. M81 and M82 do stand out even in relatively light polluted skies. M81 looks like a small elliptical fuzzy object and M82 appears as a small cigar-shaped object. I am able to see these galaxies because they are relatively bright, especially their cores. It was very exciting to see both of



*CCD color image of the M13 globular cluster in the constellation of Hercules*



them at the same time in a wide-angle, low power, eyepiece! What you will not see is the faint outer portions of the galaxies. In my telescopes, even from darker skies, The Andromeda Galaxy, M31, appears as a fairly bright oval, somewhat fuzzy, object. Depending on the field of view, and if a wide field eyepiece is used, you may also see the small companion galaxies M32 and M110. What you will not see are the faint details such as the dust lanes and outer disk structure.

### Color in the Eyepiece

With anything except bright stars such as the red giant Betelgeuse or some of the "carbon" stars and possibly the planets, one should not expect to see color. The color is there and long exposure photographs or CCD images do discern the color, but the color receptors in the eye are simply not sensitive enough to perceive them while observing nebulae or other deep sky objects using moderate or even larger aperture amateur telescopes. I understand color can be discerned in some brighter nebulae using apertures of approximately 25 inches.

In conclusion, amateur astronomy can be a relaxing and rewarding hobby. It can provide a lifetime of enjoyment. One can enter the hobby with limited funds and still expect wonderful vistas in the eyepiece. Less than optimum sky conditions can be tolerated and should not deter one from exploring amateur astronomy. One should also realize that the pretty color pictures on the boxes of department store telescopes are not what to expect in the telescope's eyepiece. Start with a reasonably good telescope in the aperture range suggested above, don't expect Hubble-like vistas, expend the effort to learn good observational skills, and enjoy this spectacular hobby of amateur astronomy.

## Did You Know?

In 1733, Chester Moor Hall discovered that a so-called "achromatic" telescope could be built by combining two types of glass inside each lens. To keep his invention a secret, Hall commissioned two lensmakers to work on different halves of his lenses. Each lensmaker turned out to be busy, however, and passed the job on to someone else. Unfortunately for Hall, each man chose the same subcontractor - and his secret was out.

After becoming an Astronomer Royal in 1742, James Bradley was reportedly offered a salary increase, and promptly declined. If the position were made too lucrative, he explained, only conniving politicians and noblemen would be appointed to it.

Early astronomers tried to compensate for poor lenses with exceptionally long telescopes. In 1722, Bradley used a telescope 212 feet long.

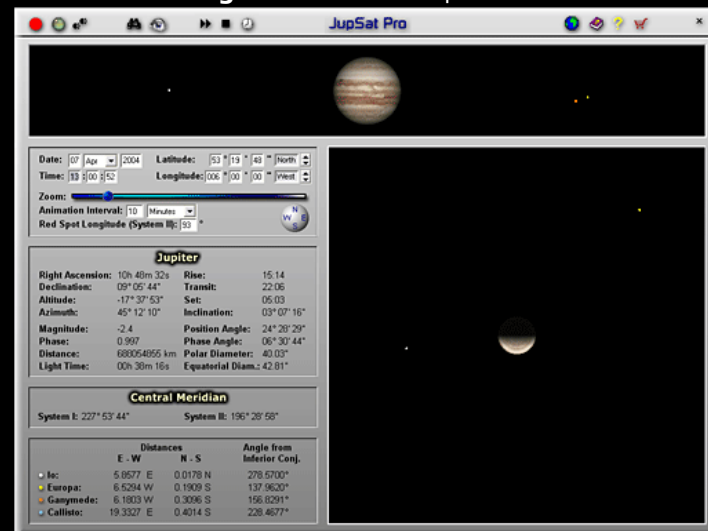
Albert Einstein's wife was once given a guided tour of the Mount Wilson Observatory (in California), whose giant optical telescope was among the largest in the world. "One of the principal functions of all this sophisticated machinery," an astronomer explained, "is to determine the extent and shape of the universe." "Oh," she replied, "my husband does that on the back of an old envelope."

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# Meade ETX90 EC Maksutov Cassegrain Telescope

By Kevin Berwick

I bought a Meade ETX90EC telescope a number of years ago and have just got round to reviewing it recently. Let me say at this point that I have no undisclosed interest in the vendor or product reviewed here and I purchased the telescope via normal channels. At the time I bought the scope, my principal interests were in observing the (bright) deep sky with my Televue TV101 refractor, although since the publication of Charles Wood's 'Lunar 100', in Sky and Telescope I have become a very keen observer of the Moon. I live by the sea in the suburbs of Dublin, Ireland and the skies, while bright, are fairly good over the sea.

I really love observing the sky and like many astronomers in cloudy parts of the world, wish I had more clear skies. I bought the ETX90 EC as a portable travel telescope. I have brought the telescope to the Canary Islands and to various rural parts of Ireland. In principle, I suppose I could bring my TV101 on trips, but I have had my 101 a long time now and, for sentimental reasons, wouldn't like to risk damaging it as checked luggage on flights.

Like many observers, I find that I am extremely sensitive to setup time when it comes to actually using equipment. If setup takes even ½ an hour, it could be overcast again here at home so 5-10 minutes is the maximum I will devote to setup. For that reason, all

my telescopes are small alt-az mounted, rugged telescopes. Needless to say, if I had an observatory, this would change everything, but I am still working towards the arrival of that happy day.

The specifications of the ETX90EC are very impressive. The telescope is small, at 38cm x 18cm x 22cm (15in x 7in x 9in) including the mount.. It is also very light at 3.5 kg (7.8 lbs.) with electronic controller and 8 AA batteries. The focal ratio is f/13.8, fairly long nowadays.

At the time I bought the telescope, the Autostar Controller, allowing GOTO operation, and tripod were extra, now they are free. If you don't want the GOTO, you can operate the telescope with an Electronic Controller, a paddle allowing you to move the telescope. I ordered the telescope and Autostar from Dark Star in Wales for a total of £750, a whopping US\$1350. The typical price in the US is c. \$600.....don't get me started on the price of telescopes in Europe! The telescope and Autostar arrived in cardboard boxes, well packed in polystyrene.

No case is included in the price so I ordered one separately. I bought a tripod for the telescope from a friend who uses his ETX90 as a finder telescope now. The

tripod is not the same as that for sale currently, which is much improved from the original.

## Out of the box

The metal telescope tube has a very high – tech looking, blue finish, which has stayed looking good with no maintenance apart from the odd wipe with a damp cloth. The tube comes complete with a machined metal cover. The optics were dust free, inside and outside, when I looked first and the corrector has a blue colour indicating that it is anti-reflection coated. The aluminised spot on the corrector looked nice and bright from the front, a good sign, even though it is the back of the spot that does the work. There is a baffle in the system, visible from the front. It is possible to remove the front corrector plate, simply by unscrewing it, however, this is not recommended as it could let dust in and also might cause collimation problems. There is no provision to allow you to collimate the telescope, alignment is permanently set at the factory. The tube assembly has a flip-diagonal mirror, allowing you to steer the image 90 degrees from the optical axis. When the mirror is in place, you can use the telescope visually. You can put a camera along the optical axis, allowing the light to fall on the camera by simply removing the mirror by twisting a wheel on the back of the mount. This is a nice feature, you can view an object in the sky and, with a flick of the mirror, be ready to photograph it. I assume you could put an eyepiece in the telescope in the straight-through configuration, but it wouldn't be that useful since once you viewed anything above 45 degrees, the mount would prevent you from getting your eye to the eyepiece. So in practice, all visual use is done with the mirror in place.

The focuser is very small and very difficult to reach when the telescope is pointed above about 45 degrees, since the back of the tube, where the focuser is situated,



*All you need for a computerised night under the stars*

ed, swings over the mount base with minimal clearance. This is a real weak point of the telescope. Various third party manufacturers make flexible cables which can be attached to the focuser to address this, although a clothes peg seems to be the quick and nasty fix of choice!!

The mount is plastic, with locks for the both the azimuth and altitude axes. These locks are very poor. Tighten them too much, or not enough, and the telescope will not move. You do get used to knowing how much to tighten them though. There are setting circles on each axis. Although I haven't used them they don't

look as if they would work very well. The azimuth one in particular seems to be made of paper thin plastic. However, since it is a GOTO telescope, I doubt if many people out there would find it a problem. Maybe Meade should think about removing them. The battery compartment holds 8 AA batteries, there is provision on the telescope for running it from the mains. Interestingly, the Autostar takes power from the telescope, it does not have it's own batteries. There is a minute finder telescope on the ETX90EC, a refractor, complete with cross hairs. I find it next to impossible to use since it is attached very near to the main OTA and very hard to get your eye close without banging your nose on the telescope or straining your neck. It is just about usable to find a couple of alignment stars to initialise the Autostar system. I wouldn't use it for star hopping, unless you want to spend your daytime hours in a neck brace!!

You get a free 26mm Plossl eyepiece with the telescope, giving you a magnification of 48X.

Overall, this is a very nice telescope, but the mount is a bit of a let down. This is not a poor man's Questar. Meade obviously built this machine to a price-point. They put the money into the optics and the Autostar and sacrificed the mechanical quality of the mount. To be fair, as an engineering decision, I would say that they did the right thing, improving the mount by making it metal would be expensive, bringing the price of the ETX90EC too close to the cheaper of the Meade SCTs. As I understand, the telescope was built to bring GOTO to the masses and it has certainly succeeded in that. Look at a 15 year old Sky and Telescope to see what this money would get you in the late eighties and you will be amazed at how far technology has come.

### In use

The telescope is extremely quick to set up. Two bolts connect the telescope to the tripod. Clip the Autostar into the mount and you are ready to go. I left this telescope set up during the last Mars approach and could carry the lot out, in one hand, to my garden for a quick, after work view. This lightness does mean the telescope can be shaky, it is very easy to kick the mount and throw the system out of alignment. I am sure a home made solution involving a bag of sand and some string could fix this easily.

At this point you have 2 options, you can use the supplied paddle or Autostar to view in alt-az mode, or you can set up the Autostar to allow full GOTO operation as well as motorised tracking. Unfortunately, it is impossible to use the telescope manually, you must use the motors to move the telescope. The big downside of the system is that slewing the telescope is very noisy, the best comparison I can make is that at the top speed, it sounds like a fairly large radio controlled car. I realise that this may be more of a problem in Europe, where gardens are small, than in the US, where gardens are generally bigger. However, if you live in an apartment and your neighbours leave their windows open at night, I would factor it in to my purchasing decision. Even when the telescope is merely tracking, the telescope is too noisy for my liking. It

makes a variety of grinding noises whose pitch seems to change a lot over time, even stopping altogether momentarily sometimes. Initially I thought that it was a problem with my telescope since it sounded like the



*A close-up view of the ETX*

gears were literally being chewed but it seems that this is normal. While the noise while tracking won't wake your neighbours, it is slightly alarming and nothing like the pleasant quiet whine you get from an LX200 for example.

### Optics

A star test indicated that the optics were very well collimated, a relief since as I said earlier, if they are knocked out it means a trip back to your dealer. Anyhow, after the star-test, I took a look at the first quarter Moon. The colour correction is very good, the joy of an almost totally reflective system. Low power views of star fields, I used the Wild Duck cluster, were superb and indeed, refractor like. Planetary views were a lot better than I thought they would be. I could easily see Syrtis Major and Solus Lacus, - the 'Eye of Mars', as well as the polar cap on the planet even early on the recent apparition of Mars. I was very impressed with the optics.

One point that should be mentioned is that you would generally use long focal length eyepieces with this telescope since the focal length is fairly long. On the plus side, longer focal length eyepieces give good eye relief. In addition, telescopes like the ETX90EC with long focal lengths don't need complex eyepieces to give good images. Plossl eyepieces are perfectly adequate, which should reduce the cost of equipping the telescope with a range of magnifications.

### Autostar

The Autostar is probably the main reason you would buy this telescope, so a short description of how it works in practice is probably worthwhile here. Autostar set up is fairly quick, approximately 4 minutes. You point the tube North and after entering the date and time, you simply level the tube, in order



to tell Autostar when the tube is horizontal. After that you align on one or two stars, two is better, and you are ready to go. Initially, I used to be very careful on the alignment process, for example I used to use a bubble level and compass to determine level and North. However, I now find that this isn't necessary if you know the position of a couple of bright stars, fixing the telescope on the stars is the critical part of the align procedure. Now I just 'eyeball' level and align the tube with one of my paving slabs before the 2 star align. Once set up, the GOTO system is a real strength of the system. I always got the object I wanted to view in the field of a low power eyepiece after GOTO. In addition, the telescope would track for well over an hour in a low power eyepiece on average before losing an object.

Autostar comes with a database of several thousand deep sky objects, more than you could ever view in a lifetime. It has to be said that not all of them would be spectacular, or even visible, in the ETX90EC. The Autostar system is common across a wide range of Meade telescopes including many with a far larger aperture. Some degree of discretion is therefore necessary therefore, when planning your night under the stars.

Descriptions are available from the Autostar as to what you are looking at. These are remarkably detailed and come complete with a World Wide Web style, hypertext system where you can 'drill into' any of the technical terms in the description for further explanation. You can also run 'Guided Tours' where the system will point to a number of the 'greatest hits' visible that night from



*The Autostar hand-control unit*

your location. A variety of other features are built into this remarkable system, including a battery monitor, a Help function, power saving utilities and even a torch (which incidentally comes on automatically when you are prompted for the time during alignment, so you can read your watch – seems that Meade have thought of almost everything!! )

One big strength of the Autostar is that the software is upgradeable via the Meade website at no charge. This means that the GOTO system is continually evolving, unlike, say, the equivalent Celestron offering. Each new release of the software fixes known bugs and adds features requested by Meade customers. In addition, you can download new guided tours either from Meade or from 3<sup>rd</sup> parties.

You can also run the system from a variety of Planetarium programs. I tested the system using SkyMap Pro V. 8. The telescope successfully established communication with the PC and after that, you could browse the virtual night sky on your PC and, once you came across something interesting, simply click GOTO to slew your telescope to the object. Nice!!

You can even look up the orbital elements of spacecraft like the International Space Station on the Internet and track it during its pass. I haven't done this myself yet, but it would be nice to try.

I was very impressed with the Autostar. It never crashed on me, except when the batteries ran low and seems at this stage to be a very mature technology, with few bugs left in it.

## Summary

Although I have pointed out some deficiencies with this system, you have to remember the incredible value that this telescope represents. You are getting excellent optics and a very comprehensive and accurate GOTO system for less than the price of a decent bicycle. Sure, you may not be able to hand this on to your grandchildren, with heavy use I am sure the nylon gears and plastic mount would start to protest, but most people would have upgraded long before this telescope wears out.

You will get excellent views of the Universe delivered to you painlessly with this telescope, bypassing years of learning the night sky by star hopping. You can even dabble in astrophotography of the Moon and planets, with a webcam, for example, with this telescope. Of course, it's not perfect, the mechanics in particular show evidence of economising, but remind yourself again of the price. In conclusion, Meade are to be congratulated on putting this amazing instrument together, at a price I would never have thought possible.

## Pros

- Super light
- Highly Portable
- Excellent optics
- Superb value
- Excellent upgradeable GOTO system

## Cons

- Construction quality of mount is very poor
- Very noisy slewing
- Lightness means that the telescope is prone to shakiness
- Poor inaccessible focuser
- No provision for user collimation



# the ancient astronomers of newgrange

By Anthony Murphy

Other constellations may also be featured at Newgrange. [Kerbstone 52](#) is one of the finest decorated stones of neolithic origin in Ireland. Located at the northwestern side of the great kerb, it is diametrically opposite the entrance stone, [Kerb 1](#), and features a vertical line down the centre. A line plotted between Kerbstone 1 and Kerbstone 52 points in the direction of Summer Solstice sunset.

No thorough interpretation of the stone's designs has yet been made, but I believe it contains representations of the belt stars of Orion, and that the large 'star' bored into the vertical line represents [Sirius](#), the brightest star in the night sky. Sirius shared the same declination as the Winter Solstice sun around 3,150BC when Newgrange was built, and it is possible the people who constructed Newgrange were well aware of this coincidental alignment, and therefore they may have used the passage of Newgrange to watch the precessional drift of Sirius over long periods of time, even if it was not constructed for that purpose.

The neighbouring kerbstone, number 51, may contain representations of the constella-

tion [Cassiopeia](#) with its familiar W shape. This is another constellation which would skim the horizon in the late [Neolithic](#), and its distinctive shape would have been readily identifiable, as it is today. We know from ancient myths that this constellation was identified with a very important deity by the ancients. Charles Squire, in his 1912 volume ["Celtic Myth and Legend"](#) says: "For the children of Dôn were certainly gods of the sky. Their names are writ large in heaven. The glittering W which we call "Cassiopeia's Chair" was to our British ancestors Llys Dôn, or "Dôn's Court". This same children of Don have been identified with their Irish counterparts, the children or people of the goddess [Danu](#), and Danu herself was the Irish Cassiopeia.

This is another constellation which may have been featured as a target of the [Fourknocks](#) construct, and the familiar zig-zag patterns carved on some of the lintel stones in Fourknocks may be associated with this constellation. Author [Martin Brennan](#), whose pioneering work on Neolithic astronomy and art in Ireland has been widely published, suggested that the quadrangle shapes on these lintel stones may be connected with the head of the constellation [Draco](#), which as we have already seen was the polar constellation in the Neolithic.

Some other alignments at [Newgrange](#) are worthy of mention. [Site A](#) is a sizeable tumulus located southeast

*Kerbstone 52 at Newgrange is probably the finest decorated stone of neolithic origin in Ireland, and certainly one of the most decorative in Europe. Located at the Northwestern side of the great kerb, it is diametrically opposite the entrance stone, Kerb 1, and features a vertical line in the centre. This stone faces in the direction of Summer Solstice sunset.*

*No thorough interpretation of the stone's designs has yet been made, but it could possibly feature representations of the belt stars of Orion, and it is possible that the large 'star' bored into the vertical line represents Sirius, the brightest star in the night sky. There is astronomical reasoning behind this interpretation of K52.*



of Newgrange. It sits in direct alignment with the [Winter Solstice](#) sunrise as viewed from Newgrange, but is much lower down than the rising sun. [Site B](#) is one of the smaller satellite mounds near Newgrange, and is located southeast of the great mound at the edge of the Boyne river. Observations made by us in June 2000, confirm that the [Summer Solstice](#) sun sets directly at Newgrange when viewed from this mound. Another satellite mound, the largely destroyed [Site U](#), sits directly due east of Newgrange, and therefore the two may be aligned on equinox sunrises and sunsets. Just west of Newgrange there are two satellite sites called [K + L](#), which were excavated during Professor Michael O'Kelly's major works at Newgrange. Much of the passage and kerb stones of site K remain, and Martin Brennan has pointed out that the passage is aligned directly north-south.

### Dowth

From Newgrange, we move further to the east, and possibly further back in time, to the megalithic cairn at [Dowth](#), located less than a mile away. Dowth in Irish is Dubad, which means "Darkness" or "Place of darkness". It is the only one of the three great mounds of [Brugh na Bóinne](#), the others being Newgrange and Knowth, which has not been excavated and reconstructed in modern times.

Some old-style archaeological work was carried out here in the middle of the 19th century, around the time of the [Great Famine](#). By old-style, I mean the typical Victorian grave-robbing archaeology where the recovery of valuable finds and treasure is the main objective,



*The mound at Dowth*

and where little concern is given to returning archaeological sites to their original state. It was during this work that much of the top of the mound was removed, resulting in the huge crater in the mound which can be seen today. There are two known passages at Dowth, both on the western side. Only part of the kerb of stones is exposed, along the east, south and southwest of the mound. Many of the kerbstones remain buried. But some of those which are exposed are very exciting, especially kerbstone 51 on the east side, which has been named the "Stone of the Seven Suns".

It contains what appear to be suns, or stars, with rays

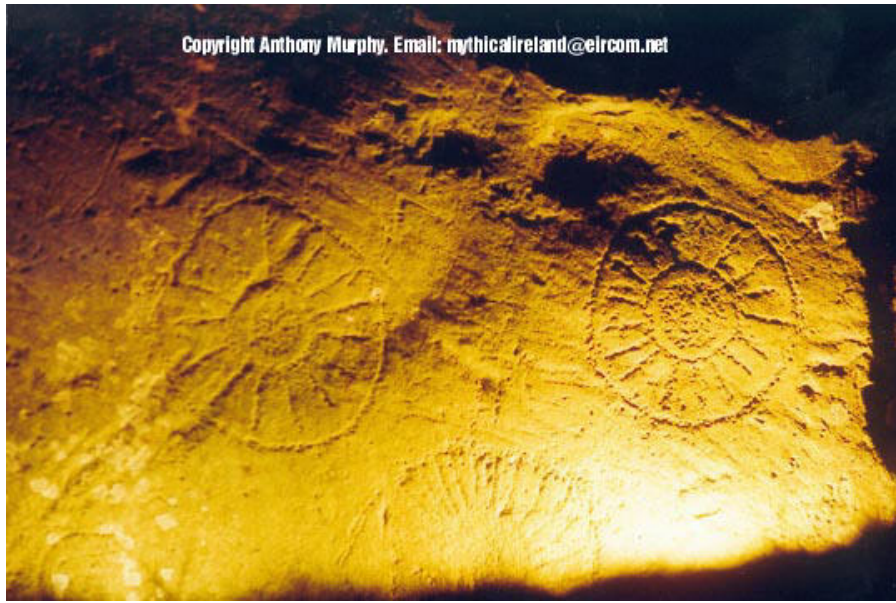
coming out from the centre, and with the whole surrounded by a circle. There are seven of these suns in total, six of which are contained within circles. Attempts have been made to explain the meaning of these symbols - some say they are representations of the sun at different times of the year, others say they represent celestial bodies such as comets. One thing seems certain - they represent heavenly bodies of some form. It really is an impressive stone.

It is to [mythology](#), and particularly the ancient story about how Dowth was built, which reveals an ancient astronomical symbolism which may help to explain something about the meaning of the 'Place of Darkness' and the Seven Suns stone. The story comes from the [Dindsenchas](#), a collection of ancient stories about Irish placenames, and concerns [Bresal](#), who was the ruler of the time.

"In his time there fell a [murrain](#) on [kine](#) in every place in Ireland, except for seven cows and a bull that increased strength for every farmer in his time. By him is built the solid hill in the likeness of [Nimrod's tower](#), so that from it he might pass to heaven, - that is the cause why it was undertaken". The story continues to tell how Bresal's sister stopped the Sun from moving so that there would be 'no night but bright day' until work reached completion. Unfortunately, they committed incest and the Sun went down . . .

The men of Erin left the task incomplete, saying: ". . . since darkness has fallen upon our work, and night has come on and the day is gone, let each depart to his





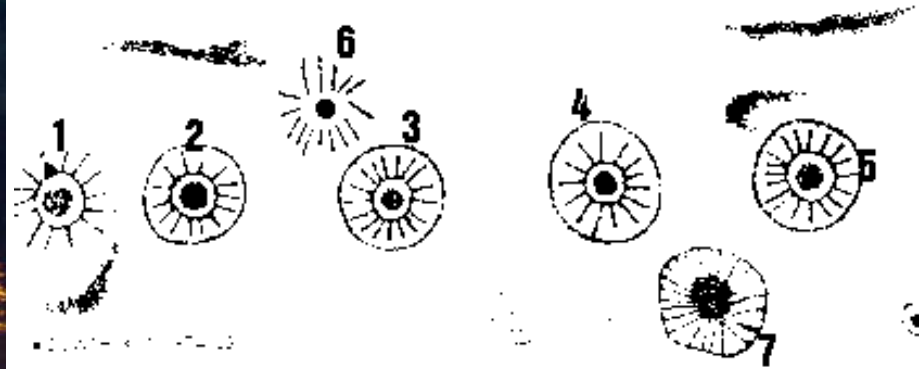
*Kerbstone 51 is one of the most beautiful Neolithic carvings known to exist in Ireland. It is located on the eastern side of the great kerb around the cairn of Dowth, and its significance as an astronomical stone has never been doubted. It contains what appear to be suns, or stars, with rays coming out from the centre, and with the whole surrounded by a circle. There are seven of these suns in total, six of which are contained within circles.*

place. Dubad (darkness) shall be the name of this place for ever."

Given that there are seven "suns" on [kerb 51](#), and that the mythology about Dowth speaks of a bull and seven cows, it seems likely that the site has some connection with the constellation of [Taurus](#), the Bull, which contains the open cluster the [Pleiades](#), otherwise known as "The Seven Sisters". This constellation was very important around the time the Boyne Valley mounds were being constructed, as it contained the Sun on the [Spring Equinox](#), that very important moment of the

Sun's position among the [zodiac](#) stars at this time which determines the current 'age' - i.e. the "Age of Taurus".

Another interesting phenomenon which occurs at this time is what is known to astronomers as a '[heliacal rising](#)' of the Pleiades. This happens when the stars in question rise at the eastern horizon but are quickly lost in the glare of the rising sun. It is interesting to note that the Egyptians, and the [Dogon tribe in Africa](#), among others, used the same Dowth-like 'sun-wheel' symbols to signify a heliacal rising.

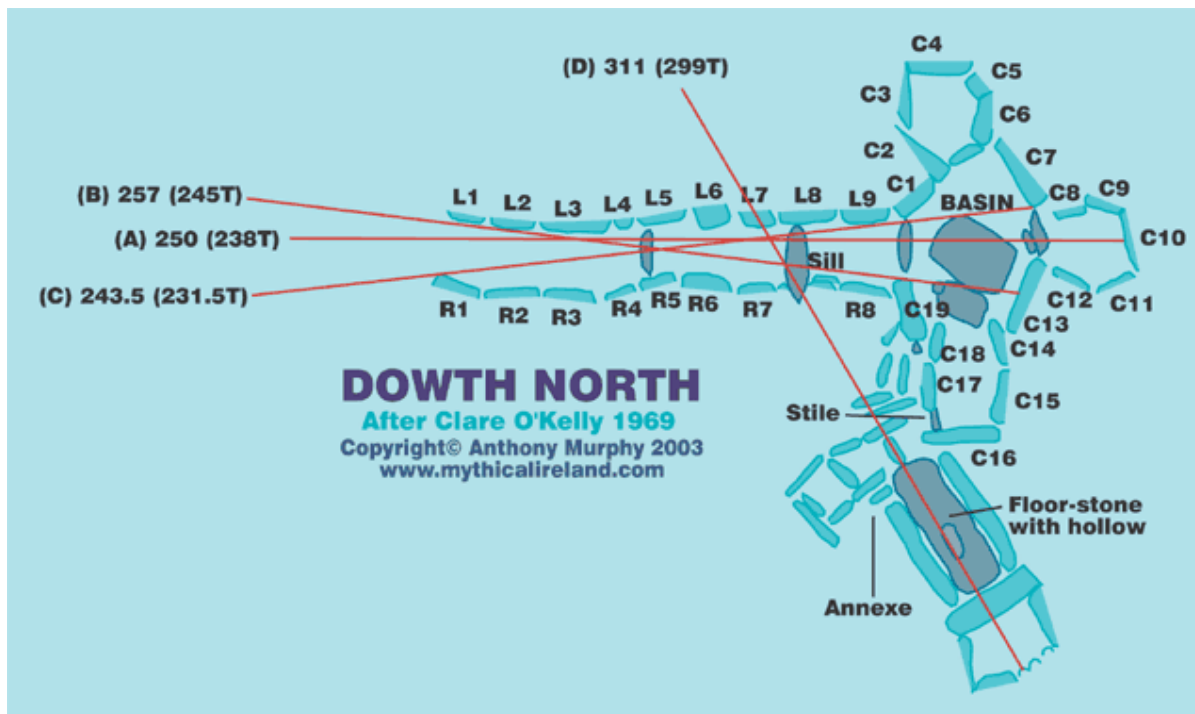


*Another interesting point about these symbols is the amount of strokes, or rays, which appear to emanate from the sun symbols. There are a total of 116 notches, counted on the individual sun-wheels as follows (see diagram below): (1) 14, (2) 14, (3) 17, (4) 14, (5) 18, (6) 15, (7) 24. 116 days represents four synodic periods of the Moon, the most basic breakdown of the sequence of the Metonic cycle. If we take out the count for circle three (17 notches) we get 99 notches, which could just be an indicator of the eight-year, 99 synodic lunar month Metonic period.*

year when the Sun's path along the ecliptic crossed the celestial equator heading northwards. It is the

If these 'sun-wheel' symbols do represent the heliacal rising of the Pleiades, it could tell us something very significant about the Neolithic people - they were aware of the great cycle of [precession](#), the slow wobble of the Earth's axis which causes the celestial pole to shift over time, resulting in the Vernal Equinox point, that place where the Sun crosses the celestial equator, moving backwards, or westwards, through the Zodiac over a huge 25,800-year period. This Vernal point moves just one degree (about two widths of the full moon) every 72 years, and spends on average 2,150 years in each of the twelve constellations of the Zodiac.

The astronomical function of Dowth is not in question. In 1980, Martin Brennan, who suspected the southern



*The plan of the Dowth North chamber, as at Newgrange, is cruciform, but smaller, measuring 11 feet high, and about nine feet in diameter. The passage is 27 feet long, and the entrance has been reconstructed in more modern times, so it is impossible to say what the original length of the passage was. It may have been roughly twice its current length, given the fact that the kerb of stones on this side of the Dowth mound is located in the next field.*

*The orientation of the northern passage of Dowth is given as 250 degrees magnetic azimuth in Clare O'Kelly's 1969 drawing. This may be an old survey, but the alignment of Dowth North has been confirmed by another recent survey. The results point towards the possibility that this passage was, in fact, oriented towards the setting position of the Moon for minor standstill south setting in c3300BC.*

passage and chamber was aligned on the Winter Solstice sunset, gained access to the chamber, and with the help of some fellow enthusiasts, he filmed the beam of light from the Winter Solstice sunset as it

reached forth across the floor of the chamber and struck the bottom of one of the decorated chamber-stones.

This few minutes of 8mm cine film, which I had the rare chance to view just over a year ago, helped along with other discoveries in that year to prove something which Brennan had believed from the time he had begun his research into the Neolithic sites - that Newgrange did not exist in isolation as an astronomically-aligned structure.

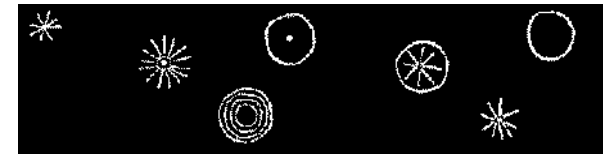
The [Winter Solstice](#) alignment of [Dowth South](#) has in recent years become the focus of study for artist and author AnneMarie Moroney, who has spent the last four winters recording, photographing and studying the phenomenon.

She says that From November to February the rays of the evening sun reach into the passage and then the chamber of Dowth South. During the winter solstice the light of the low sun moves along the left side of the passage, then into the circular chamber, where three stones are lit up by the sun. The convex central stone reflects the sunlight in to a dark recess, lighting up the decorated stones there. The rays then recede slowly along the right side of the passage and after about two hours the sun withdraws from Dowth South. Interestingly, she also says that the builders of the passage mounds seemed to realise that the human eye would be harmed by watching the sun directly. By directing the sunbeams through a small opening, the slightest changes in the position of the sun could be observed safely. The [Northern passage](#) too may be astronomical in function, although an entrance shaft erected in more modern times prevents any sunset from being watched from within the passage. Some researchers have suggested it is aligned on the [cross-quarter day](#) sunsets on November 8th and February 4th, and Anne-Marie Moroney has carried out some preliminary measurements and studies which would back up this idea.



The northern passage is inaccessible to the public, and was disturbed in the early Christian period by the construction of underground storage chambers called [souterrains](#). However, those lucky enough to know someone with connections in the world of archaeology who can access a key to the gate of the Northern Passage, are in for a treat. That's exactly what I got when I visited in November of 2000. The chamber of Dowth North is an eerie place to be. Hidden from daylight,

and sunken into the ground, it is cold, dark and claustrophobic. The modern electrical lights do not work, the chamber is currently only accessible through a 70-foot souterrain, and the passage [orthostats](#) lean together such that when you walk up the passage, you have to squeeze through the stones. It's a strange experience, to say the least. But Dowth North could be the oldest cruciform passage in the Brugh na Bóinne area, and it is well worth a visit.



*Coffey's stellar symbols drawing*

was a reference to the Full Moon shining into the Dowth chambers before setting, once more plunging the place of darkness into, well, darkness.

There have been some suggestions in recent times that there may be a third passage at Dowth, on the eastern side. Just to the left of the Stone of the Seven Suns is a very interesting kerbstone featuring a vertical line down the centre. Other entrance kerbstones, such as [Kerbstone 1](#) at Newgrange and the entrance kerbstones at Knowth's two passages, feature a vertical line. With no major excavations planned at Dowth in the near future, it seems unlikely that we will know if there is a third passage for the time being.

One other archaeological site near Dowth is extremely worthy of a mention. Labelled [Site Q](#) on archaeological maps, it is a structure known as a [henge](#), or an embanked enclosure. It is said by some to be the second largest such ringed structure in Ireland.

Entering the ring through its southwestern opening, the huge scale of the site and the height of the surrounding banks give one the impression of a giant amphitheatre. If this was some kind of ceremonial site, it certainly smacks of grandeur and hugeness. There is a second opening, to the northeast of the ring, which may or may not have been contemporary with the construction of the site. But if one stands outside the structure, to the southwest, and lines up the two entrances, this is the exact line of Summer Solstice sun-



*The sunbeam in the chamber of Dowth South around the time of Winter Solstice.*

The Neolithic passage and chamber seem to be older in date than Newgrange, and possibly [Knowth](#), due to the fact that the passage at Newgrange is more advanced, with water drainage techniques incorporated into its roof structure which were not found at Knowth. The interior of Dowth North seems to carry on the astronomical theme present on some of the great kerbstones outside the mound. The [chamberstone C7](#) is particularly well decorated, featuring a number of stellar symbols, concentric circles, a small spiral, linear markings and other features such as small inverted V shapes.

The astronomical theme was also picked up by George Coffey, keeper of Irish antiquities at the National Museum, a century ago. Coffey noticed that many of the star/sun symbols at Dowth were repeated at Newgrange and [Loughcrew](#). Perhaps at some time in the future, the concrete shaft will be removed and once more the light will be allowed into Dowth North. For the time being, it remains off bounds even to the sun.

Interestingly, a number of white quartz stones have been found near what would have been the original entrance to this passage, and this could be another link with the Moon-Milky Way theme which we picked up on earlier at Newgrange. Dowth is also known in legend as the place where [Boann](#) is buried - perhaps this



*Aerial view of the Dowth mound*

rise, an event which I have been witness to.

Regrettably, it will take an actual excavation of the site to discover if both openings were contemporary with the original design of the site, but even if that north-eastern entrance turns out to be a 19th century agricultural breach, the alignment raises the interesting, and somewhat speculative suggestion, that perhaps the southwestern entrance may have allowed viewers in the centre of the ring structure to accurately view Winter Solstice sunset, perhaps as part of some major ritual event. From the air, [Site Q](#) is egg-shaped, just like Newgrange, and the fact that it may share a Winter Solstice sunset alignment with nearby Dowth is interesting indeed.

*To be continued*

Anthony Murphy maintains two megalithic websites:

[Mythical Ireland](#)  
[101 Facts about Newgrange](#)

# MOON LUNEY

By Tim Conrardy

Knowing that the total lunar eclipse was coming up, I proposed to the [KvR music community](#) to compose pieces inspired by the moon. Many took on the challenge including myself. The result was *Moon LUNEY*. It started as an ambient piece, but went off into an eastern type of feel with positive chord changes. The entire piece was created on computer using "Virtual Studio Technology" (VST) which translates to using the computer as a sound generator much the same way you would use a hardware keyboard from a music store. I also added guitar and played a drum set. All of this was recorded into the computer with a program called "[Tracktion](#)". It's wonderful that you can now do studio quality recordings in your living room .

Here are some links to other lunar pieces from KvR musicians who posted their works:

Jim Hunter: [The Hunter Eclipse](#)  
 (http://hunter.audioshot.net/tempmusic/TheHunterEclipse.mp3)

vurt :(very ambient) [Tim's Full Moon](#)  
 (http://www.vurt.audioshot.net/myweb10/moosic/timsfullmoon.mp3)

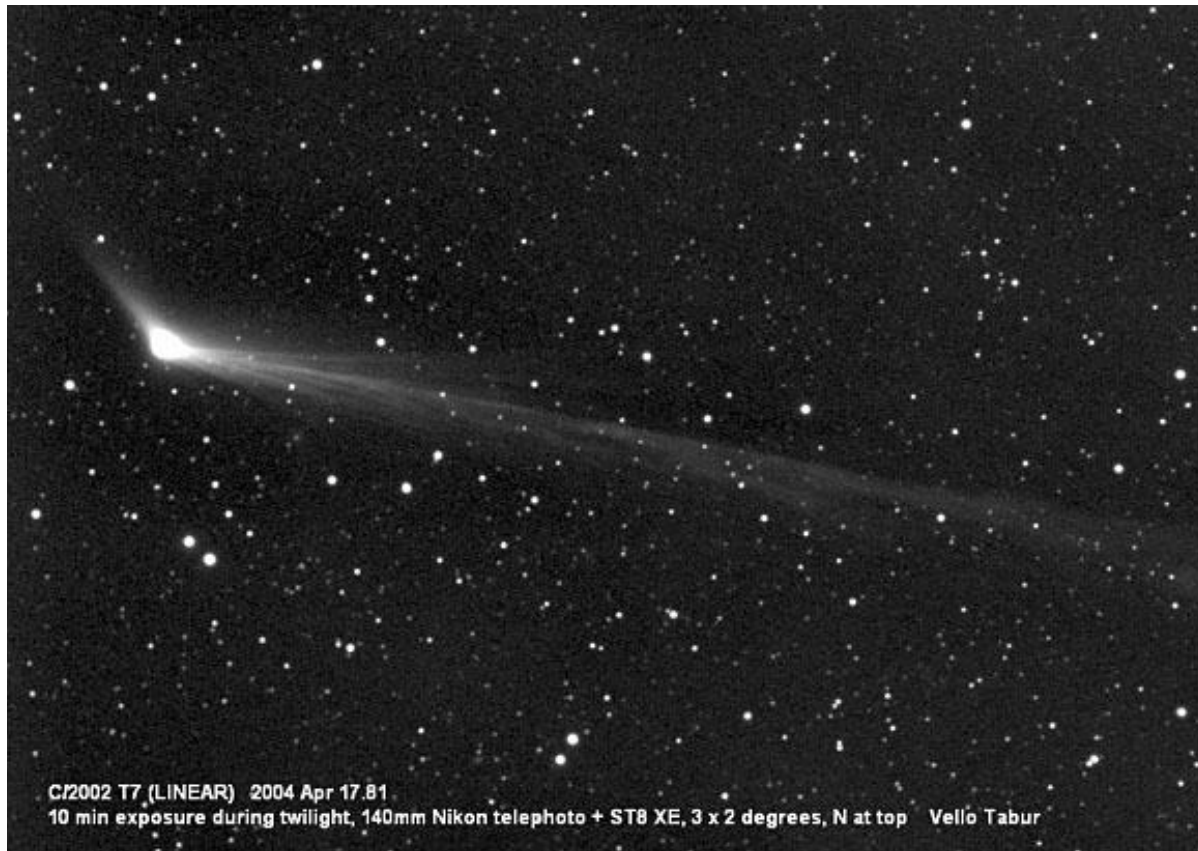
Kriminal: [Lunar Sunrise](#)  
 (http://www.groovecell.com/music/lunar-sunrise76bpm.mp3)

I was able to put these pieces onto CD and play them while I observed the lunar eclipse. Just perfect for the evening. A satellite transit was predicted at the end of the eclipse and I was able to see the satellite (with observable wings) flutter across the moon surface. The music really helped to enhance that moment as well. I would advise every observing session be enriched with space music, or your own favorite music to listen to. Our company "[Algomusic](#)" produces music software products inspired by Astronomy. Our main product (right now) is the M42 Nebula VSTi. Its focus are space sounds and ambient music.



# Into Cold Air...

by Ron Robisch



C/2002 T7 (LINEAR) 2004 Apr 17.81  
10 min exposure during twilight, 140mm Nikon telephoto + ST8 XE, 3 x 2 degrees, N at top Vello Tabur

The incredulous facial expressions of loved ones quickly faded from memory as I pulled my Grand Caravan out of the driveway and onto the gravel road leading away from my in-laws' farm in beautiful, remote [Potter County, Pennsylvania](#). It was nearing sunset on a frigid Sunday in February, and I had some serious observing to do at [Cherry Springs State Park](#), home of late summer's annual [Black Forest Star Party](#). Although the icy, snow-covered roads demanded my attention, my gaze was repeatedly drawn to the outdoor temperature reading provided on the minivan's overhead console: 11 degrees Fahrenheit ( $-12^{\circ}$  Celsius) at departure.

My father-in-law, Steve, made it a point to give me a temperature countdown in the last few hours preceding my departure. He received a nice weather station from my wife and me at Christmas, and he felt some sort of obligation to make sure I knew *precisely* what the weather conditions were. In his most official sounding voice he declared: "*The atomic time is 3:43 pm and the current outdoor temperature is 15.4 degrees Fahrenheit.*" An hour later: "*14.5 degrees Fahrenheit!*" As I walked out the door around 6pm, it was "*12.4 degrees Fahrenheit!*" Thanks, Steve.

I'm sure Andrea, my already-concerned wife, really appreciates the announcements. At first I think Steve felt that once I fully appreciated what the temperature was outside, I would give up this silly notion of going stargazing. Later, when he realized I was going anyway, I think he was genuinely amused and was trying to underscore the absurdity of what I was going to do; to show that I was nuts. Well, my wife's a psychologist. She knows I'm nuts.

Funny thing is, I wasn't the only one. I had received e-mail over the weekend from a couple of other ama-



teurs, John O'Hara of Oil City, Pennsylvania, and Elliott McKinley of the [Buffalo Astronomy Association](#), who were also planning on observing Sunday night. I pulled in at Cherry Springs around 6:40 pm as the clear, deepening azure sky began revealing the stars above.

This region of Pennsylvania had about 18 inches of snow on the ground with a good, hard crust on top. The gravel road which bisects the observing field diagonally had been plowed, leaving a hard snow-packed surface, as had the areas around the restrooms and toward the pavilion area. Nobody was home. The temp was 6° F.

I originally drove out along the plowed road to the very center of the field. I noticed numerous snowmobile tracks that crossed over the road. As I began adding layers to what I was wearing, I wondered nervously if some crazy snowmobiler might not run smack dab broadside into my van in the dark of night (better get my scope out, quick!) Nah, who'd be crazy enough to be driving around on their snowmobile in this cold after



*NGC 925 in Triangulum*

dark? But as I soon pulled out my tripod, I heard engines and saw some headlights moving through the trees in the distance. Sure enough, the snowmobilers were out! They must be nuts, too.

Before I had gotten fully set up, another car arrived and pulled in behind me. Tom Bakowsky of the Buffalo Astronomical Association came out and introduced himself. He recommended setting up near the pavilion because it was a shorter walk to keep warm. He brought firewood.

I took his advice and soon both of our telescopes were set up on the northeastern side of the field. Tom brought a 12" Meade dobsonian and soon pointed it at Comet T7 LINEAR low in the southwest, just below gamma Pegasus. This was actually my first view of this exceptional comet. After this quick look, Tom promptly went inside his car to stay warm while his scope cooled down. He said it would take an hour to do so. I couldn't help but think that that was a lot of observing time wasted.

I began observing with my 8" Meade SCT (2080) by also viewing the comet. What a great, easy object! I pointed to Gamma (3rd base in Pegasus' Great Square) and just slewed south by one field of view. Large and bright, the tail extended about 12 arc minutes. During the next hour two other observers, John and Elliott, arrived. John brought his 4 1/2" Orion Starblast, and Elliott brought his new 11" StarMaster dobsonian.

Well, it certainly was cold, but not terribly so. I was well prepared: many loose-fitting layers, new Carhartt overalls, ski cap plus fleece hood, chemical toe warmers in my boots, hand warmers inserted into my gloves, and hot chocolate in my thermos. As the mercury dropped during the night I got cold, but not too cold,

except for my heels. They actually became so cold they HURT! Being prepared in terms of an observing plan is also very important in this weather, and here I was a little lacking. Although I had a good list of targets and all of the regular star charts with me, I had not had the time to plot several close-up charts of objects in [Sky-Map Pro](#). These are crucial for pinpointing those really faint fuzzies at the limit of visibility.

Leading into the weekend I had put in more effort for an attempted ISS lunar transit on Saturday morning. Unfortunately, it was snowing during the transit, and now I had no detailed charts.

In any event I continued my observing in nearby Triangulum:

Collinder 21, open cluster – Bright and easy, this open cluster bears a resemblance to a putter, as my friend from Virginia Beach, Kent Blackwell, once suggested. Kind of a short putter, though. Maybe my dad could use it.



*NGC 2362 in Canis Major*



IC 1731, galaxy – Within 5 arc minutes or so of Collinder 21, this galaxy was very, very faint. I suspected it only about 10% of the time.

NGCs 684, 925, and 784, all galaxies in Triangulum, were attempted in vain.

At about this point I was reconsidering my original strategy to target the faintest objects possible since I was observing from such a dark sky. Fact is, it's not easy sitting motionless for 20 minutes trying to search patiently when you know you've got to keep the blood circulating or else it will freeze solid! The cold just seeps in. Furthermore, while wearing a hat plus a fleece hood with drawstrings pulled tight, it wasn't very easy to get my eyeball to the eyepiece because of all the clothing in the way. And I really was not happy that I didn't plot those detailed charts!

So instead I took a moment to look at Saturn in Elliott's 11" StarMaster. Wow! The contrast was fantastic! Rings and surface colors were fantastic!!! The Zambuto mirror performed wonderfully.

Jupiter – Very nice at 127x and 250x in my telescope. Seeing conditions were really quite good. Three of the Galilean moons formed a nice, tight formation on one side of the planet.

NGC 2362, open cluster in Canis Major – I viewed this in John's Starblast. Beautiful!

M78, emission nebula in Orion – Viewed in Tom's 12": very nice, with another NGC nebula visible below it (I unfortunately did not note its designation.) We half-



*The Rosette Nebula in Monoceros*

heartedly searched for McNeil's Nebula, but I didn't see it.

Rosette Nebula, emission nebula in Monoceros – Also seen in Tom's scope. Usually, the borders of objects that are SO extended are tough to discern, but the borders of the Rosette are so easy. A really nice look!

Orion Nebula M42, emission nebula in Orion – Gor-

geous as usual! Even better in Elliott's scope.

Throughout the night, Tom repeatedly retreated to his car to warm up, while the rest of us plugged away. I kept thinking of the fantastic book by Joe Krakauer, [Into Thin Air](#), which presented a true story about people freezing to death at night on a Mt. Everest expedition. They didn't have scopes, but they didn't have much oxygen either.

I use a very technical method for identifying what I consider to be truly cold weather: it's when the stuff in my nose starts to crystallize. Well before midnight I had satisfied this criterion. By about 1am we were all cold enough that we decided to build a fire (Jack London's short story of this name came to mind as we struggled to get it going) in the fireplace in the open pavilion. That helped a bit, but by the time we came back out I had decided that my night was done. Morning would come fast and I had a 5-hour drive home with my family in the morning. So I packed up and headed out.

Again, while driving I watched the thermometer with one eye. As I passed through numerous peaks and valleys, the temperature rode its own roller coaster as the minivan temp reading varied from +2° F to a low of, get this, -18° F (-28° C)!!! When I passed through nearby [Coudersport](#), a bank along the road showed the temp as -10° F. The reading in the minivan said -9° F. Brrr!!!

Well, it wasn't my most productive night of observing, but it was a lot of fun anyway, and many of the mid-winter views were quite rewarding! Besides, I think the feeling is starting to come back in my toes!



# I Gave Myself a Christmas Present...

By Adolph Kurth

While participating in the [Astronomy Daily forum](#), my attention was drawn to a fellow Astronomer from Croatia named Beri.

He posted some of his home-built projects in the ATM section of the forum and described how he made these items from sewer pipe, cardboard and wood, etc. It eventually became obvious to me that optical parts of any kind were really not available in Croatia and that purchasing them in Europe was way beyond his available means.

His standard supplier for anything optical was [Surplus Shed](#) here in the U.S. but even the shipping charges were not easy to handle.

Upon reflection, it dawned on me that I had a number of items left over from projects I was never likely to finish or things I just had accumulated over time.

The next logical step was to send these items, an as-

sortment of lenses, accessories etc., to Beri in order to put things to good use instead of taking up space in my junk bin.

After Beri received these items, he informed me that an 80mm F/5 lens included in the shipment was destined for a young Lady named Marina.

Upon further enquiry I discovered that Marina belonged to a small Astronomy Club in the Town of [Vidulini](#) on the [Istrian Peninsula](#). This club was founded and is run by the local school's science teacher and that "Just about the whole school belongs to the club."

It turned out that Marina had participated in the club's 2003 Messier Marathon and had indeed found a number of the catalog's items.

She performed that feat with what she called her 1X7 Telescope. This telescope had no lenses at all, since her small club had only very limited optical equipment available.

Oh, and she was also given an award for being the youngest member participating.

Marina is all of seven years old.

I found out that Beri, who belongs to an Astronomy Club in the [city of Split](#) and lives on an island off the coast, had been helping the Vidulini club in constructing their own scopes. He had made up a complete construction Manual for the "Baby Dobs", 4.5" scopes made from Surplus Shed mirrors and scrounged parts. I figured that here was a place where I could help out. So, I collected the parts for a 6" reflector and other miscellaneous items and shipped them directly to Vidulini.

While messages about this little endeavour kept going back and forth in the Astronomy Daily forum, other people also became interested and contributed some items.

The response from Beri and the Vidulini club was overwhelming.

Apparently, the Teacher read my e-mail to the students informing them that parts for telescopes were on their way. According to the teacher, Mr. Tumpic', the students were absolutely stunned that someone whom they did not even know, would send them such a gift. The students suggested a name our little endeavour - the "[Rochester- Vidulini Project](#)" - and that their observatory site be named the Rochester-Zminj Observatory.

A designer friend of Beri produced a label to go on every scope made from the project's parts showing it is from the Rochester-Vidulini Project.

Thanks to generous help from our club and others, we are now at the point where the club has enough scopes for their use and one extra scope which would not be used very often.

It was decided to make this a Rent-A-Scope, available to other school's science teachers. This scope has been named "The Good Rochesterian". I never thought I'd contribute to a scope with a name.

Kind of makes me feel in a class with Hale and Clark. The club has also published an article about this project on their own web-site. But since it is in Croatian, I could only get the broad idea of it.

However, Beri translated one sentence for me. According to his translation Marina, when asked what she thought of all this, said: "*An uncle in America gave us the Heavens for a present*". You see what I mean about giving myself a Christmas Present ?

P.S. Following the above which occurred just before Christmas 2003, this little program has received nationwide attention in Croatia. Beri and a number of professionals decided to take this idea to all the schools in Croatia. Schools that were interested could sign up to receive a scope for the school term, equipped with eye-pieces etc. The school showing the greatest participation got to keep the telescope permanently as a gift from the Program.

The Program is named "Nebo na Poklon "Croatian for "The Heavens for a Present".

After the first successful term finished this summer, the Croatian Government has made some money available for the purchase of more optics. Beri and his colleagues will be busy building scopes again. And I'll be scrounging parts again.

For up-to-date news on astronomy and space:  
[The Night Sky Observer](http://www.nightskyobserver.com)

## THE PERILS OF ASTRONOMY

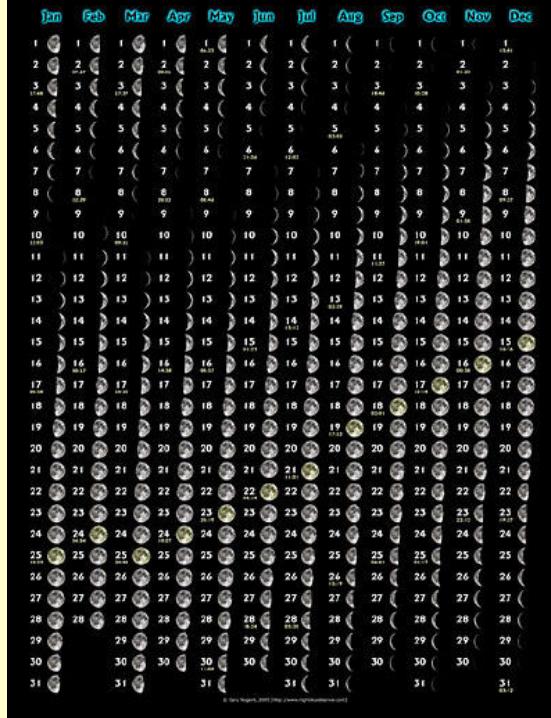
Bill Ferris drove down to Camp Verde, Arizona, for a star party, one night, the party having been promoted on the Coconino Astronomers' Web site. Arriving at 5:15pm, he was the first person there. There were a few high clouds but otherwise it looked to be a fine evening. As it turned out, he was the only person to show up. This seems odd since he's not even a member of the club.

Perhaps no one from the club appeared because it wasn't a good observing site. He was there until 8:00pm and at least one car drove by every 15 minutes. The site was close enough to the road that the headlights were a real annoyance. But that's not the half of it.

When he arrived, he noticed hundreds of empty shell casings scattered about the area. Apparently, this site was used by the locals as a gun range. And the use wasn't limited to daytime. A carload of high school kids showed up about 7:30pm. He offered them a view of M31 in exchange for the headlights being turned off. One of the boys asked him if it was okay "to shoot off a couple of mags." He thought mags were some kind of firework. The boy meant ammunition magazines. These kids were armed.

Fortunately, the boy's girlfriend convinced him it would be rude to interrupt Bill's observing and they left. He observed for another 10 minutes before deciding to pack up and go. Who knew when the next carload of armed teenagers would show up? While carrying the last piece of equipment to his vehicle, he heard the pop-pop-pop of a semiautomatic weapon being discharged somewhere to the south. After a short pause, again, pop-pop-pop. Needless to say, he left in a hurry.

## Moon Calendar 2005

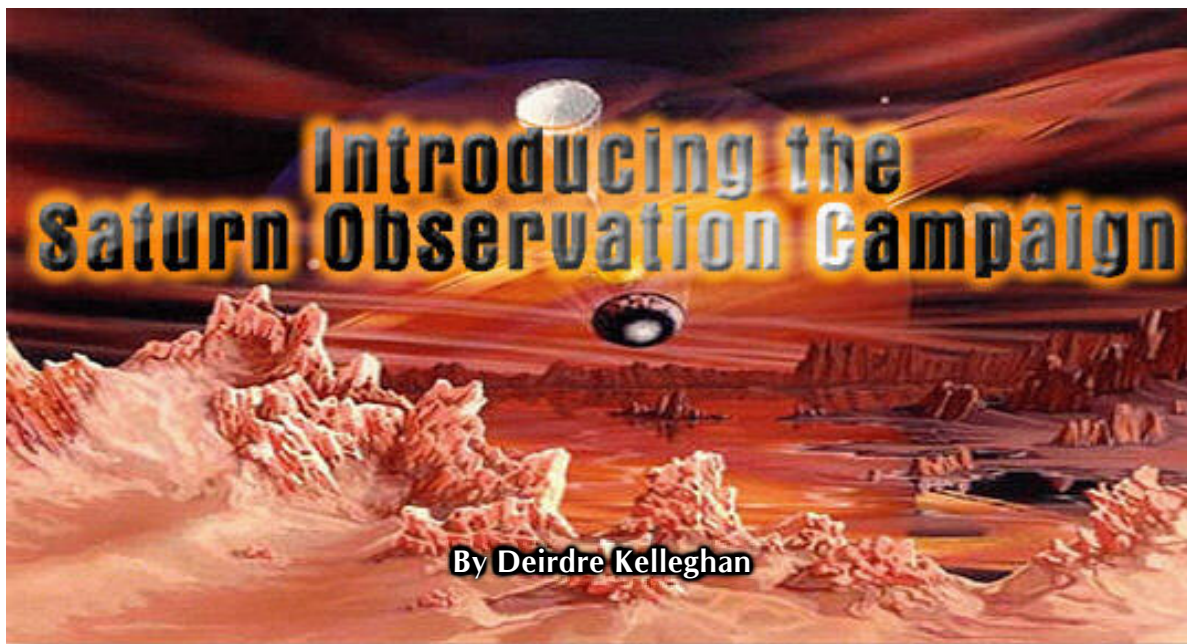


### 2005 Daily Moon Phase Calendar

Printed on 260gsm paper, this moon calendar shows the (astronomically correct) phase of the moon for each day in the year. Times of the New and Full moons and First and Last Quarters are shown in Universal Time. Full moons are presented with a yellowish tinge for easy identification. The calendar is 30cm x 42cm (12" x 16.5"). Northern and Southern hemisphere versions available. [Suitable for framing]

<http://www.nightskyobserver.com/mooncal2005.htm>





Most amateur astronomers and enthusiasts will know of the Cassini-Huygens spacecraft's brilliant mission to the planet Saturn. It took almost seven years for the probe to reach the planet. This robotic spacecraft will make more than 70 orbits of this planet over the next 4 years and will shortly be poised to release the superb Huygens probe.

Cassini's scientific mission is to study this beautiful planet, its magnificent rings, its mysterious magnetosphere and of course its many moons. And already Cassini-Huygens has made an exciting discovery of **two new moons** orbiting Saturn, bringing the number of moons orbiting the planet to 33. As exciting as all this is, there is much more to follow from this joint Eu-

ropean Space Agency and NASA adventure because, on the 26<sup>th</sup> October 2004, the Cassini-Huygens spacecraft performed a flyby of 'Titan' – Saturn's largest moon. Stunning pictures were anticipated.

This planned flyby is in preparation for the most exciting Christmas Day ever because, on the 25<sup>th</sup> December 2004, the Cassini-Huygens spacecraft will release the 'Huygens Probe, Cassini-Huygens' Christmas present to Titan. This very special Christmas present cannot be opened for the next 21 days – because that's the time it will take to reach Titan! Everything is going to plan so far and e-mails from the European Space Agency give frequent status checks of the Huygens probe- a recent one informs me:

*'Esa's Huygens probe, now orbiting Saturn on board the NASA/ESA/ASI Cassini spacecraft, is in good health and successfully passed its fifteenth In – Flight Checkout on 14 September 2004'*

So things are looking good for Christmas.

This mission really is science fiction becoming fact. A robotic spacecraft about to send a probe to a moon of the second biggest planet in our solar system. All controlled from Earth on a trajectory that takes it on a journey of 227 million miles at an average speed of 54,000 miles per hour!

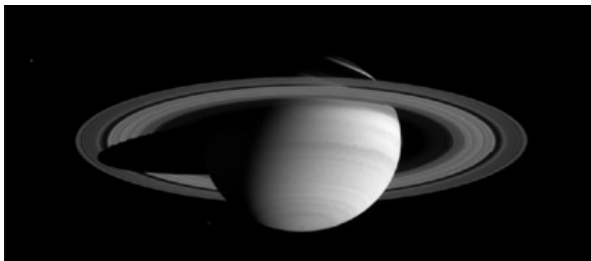
On January 14<sup>th</sup> 2005, the Huygens Probe will make its decent by free falling into Titan's murky atmosphere while switching on its scientific payload and sending data to the orbiting Cassini.

During the three hours to touchdown the probe will begin gathering information as it parachutes toward the surface of this unusual moon.

The scientific instruments on board the Huygens Probe will:

- Collect aerosols for chemical analysis
- Make spectral measurements
- Take 1,100 images of Titan's surface and atmosphere
- Measure wind speeds using the Doppler Effect
- Identify constituents in Titan's atmosphere
- Measure the physical and electrical properties of the atmosphere
- Measure the physical properties of the solid or liquid surface of Titan





*Cassini images Saturn Feb 29, 2004 from 59.9 million km*

For me, I find this all very exciting and truly wonderful and, what's more, if you visit the main [Cassini-Huygens website](#) you can see some of the magnificent images of Saturn sent almost daily from the Cassini-Huygens spacecraft. The Christmas day release of the Huygens probe will be counted down on the website's clock - days minutes and seconds to separation and then days minutes and seconds to one of the greatest achievements in the history of the exploration of our solar system - touch down on Titan.

You can become closely connected to this mission and the Saturn story by becoming a member of The Saturn Observation Campaign. This a project that gives amateur astronomers and enthusiasts of all abilities an opportunity to study the wonders of the beautiful planet Saturn. The Campaign encourages people to access a wide bank of knowledge about the planet Saturn and to share this information with others in their community. This project is also very much linked with the Cassini-Huygens Mission to Saturn and Titan.

You might ask how do I know all this; well I became the first official member in Ireland of SOC - '[Saturn Observation Campaign](#)'. It is the only international NASA Amateur Outreach Group and you too can become a member.

SOC is directed by NASA and JPL (JPL are the Jet Propulsion Laboratory, Californian Institute of Technology, these are the people who manage the Cassini-Huygens Mission). The [SOC website](#) gives an abundance of information about Saturn and the mission you can even access a pdf model of the Cassini-Huygens spacecraft for you to make-up (It took me almost three hours to assemble but it was great fun and I learnt a lot about the spacecraft). These websites are an educator's paradise and an enthusiast's dream.

The SOC is targeted to bring Saturn and Cassini into the lives of people of all ages who are unaware of this jewel of a planet and the extraordinary efforts going on to understand it and to further our knowledge of our solar system. To become a member of SOC you can fill out the application form online or e-mail Jane Houston Jones at: [jane.h.jones@jpl.nasa.gov](mailto:jane.h.jones@jpl.nasa.gov)

Jane is the senior outreach specialist with the Cassini-Huygens Programme for NASA / JPL and is a leading amateur astronomer, she offers great encouragement and is very helpful with any aspect of the programme, recently at the RTMC Astronomy Expo 2004 in the USA, Jane was awarded the G Bruce Blair Award - this award is the highest honour that the Western Amateur Astronomers can bestow upon an individual.

## Did You Know?

Four musical pieces by the French composers Julien Civange and Louis Haeri will be played on Saturn's largest moon, Titan, when the Huygen space probe lands there on Jan. 14, 2005," the Toronto Globe reported in 2004. "It will be the farthest distance from Earth at which human-made sounds will have landed on another celestial body."

## Holmes & Watson

Holmes & Watson went camping. After a campfire dinner, they retired to their tent and soon fell asleep. Some hours later, Holmes, abruptly woke his faithful friend and asked, "Watson, look up, and tell me what you see."

Watson rubbing his tired eyes, gazed upward toward the boundless heavens directly above and replied, "I see millions of stars in a perfectly clear evening sky."

"And what does that tell you?!" quizzed Holmes.

Watson pondered deeply for a moment, then proudly replied his intellectual thoughts, "Astronomically speaking, it tells me there are thousands of galaxies and potentially millions of planets. Astrologically, it tells me Saturn is in Leo. Theologically, it tells me the greatness of God's creation. Meteorologically speaking, it appears we will have a beautiful day tomorrow and time wise, it appears to be about a quarter past three. What does it tell you Mr. Holmes?"

Holmes retorted, "Watson, you idiot. Someone has stolen our tent!"

## Groucho Martian

While interviewing an unusual woman one day, Groucho Marx was surprised to hear her claim to have heard voices from another planet.

"Really," he replied. "What other planet?" "I'm not at liberty to tell you," the woman replied. "Lady," Marx declared after a moment's reflection, "it's a wonder that you're at liberty at all!"

# CELESTRON: The Early Years

By Rod Mollise



Think back—way back to the 1960s. While your friends were dreaming of minibikes, massive 8-track stereos, Corvettes and make-out parties, were you drooling over White Tube C10s, C16s and (gosh!) C22s? Or maybe you're puzzled by the old timers on [sci.astro.amateur](http://sci.astro.amateur), the Yahoo Groups, and at your local astronomy club who keep prattling on about "Classic Celestrons," "White Tube SCTs" and those aforementioned C10s, C16s and C22s?

If the above rings a bell or at least piques your interest, man, do I have a read for you. Robert Piekiehl has put together a book, an E-book, which does more than just explain the above mysteries. What Bob does is document in minute detail the early years of one of the amateur astronomer's favorite telescope companies, Celestron.

What's a White Tube? Before Celestron began mass-producing Schmidt Cassegrains in the 1970s, they had been making near-custom SCTs in a distinctly unfamiliar aperture range for those of us accustomed to the litany of C5, C8, C11 and C14. These initial Celestron telescopes, available in apertures of 6, 8, 10, 12, 16 and 22 inches, featured attractively finished white tubes with blue

mounts and fittings (thus the moniker "White Tube"). While, understandably, they were not nearly as sophisticated electronically as today's computerized marvels, these scopes had quite a lot going for them, being aimed to appeal to the professional/educational market rather than amateur astronomers (though quite a few wealthy amateurs did spring for the C10).

Even those of us who couldn't dream of spending the many 1960s dollars a gleaming new C10 or C12 commanded drooled over the Celestron advertisements showing those beautiful white SCTs surrounded by serious men in white coats — the pretty "Celestron Girls" were years away from making their appearance in the *Sky and Telescope* ads. Many of us never quite forgot these old Celestron telescopes, but, until now, the only information on them, and, indeed, on the early history of Celestron itself, has been word of mouth from older amateurs and Celestron insiders, ancient advertising copy, and a handful of articles in yellowing back-numbers of *Sky and Scope*.

You'd think somebody would've written a book about Celestron by now. After all, if any company ever changed the face of ama-



A variety of pages from "Celestron, the Early Years"

teur astronomy, it was Celestron with their ground-breaking Orange Tube C8s in the 1970s. Strangely, though, the Celestron (and Meade) SCTs, undeniably the most popular commercial telescopes of all time, have had precious little written about them. Oh, there's my book, [\*Choosing and Using a Schmidt Cassegrain Telescope\*](#), and Bob Manly's [\*The 20cm Schmidt Cassegrain Telescope\*](#), but that's been it so far.

Until recently, anyway. Now there's a new "bible" for SCT lovers, Bob Piekier's *Celestron: The Early Years*. Unlike my book and the Manly book, Piekier has chosen to focus on the historic side of Celestron rather than on buying and using current models from both SCT makers. *Early Years* gives a detailed overview of the rise of Celestron from Tom Johnson's initial interest in building a telescope for himself and his family to his conversion of his company, Valor Electronics, from a tiny vendor of power supplies and other electronic gadgets to the arguably most famous telescope company of all time.

The meat of this book, though, is the chapters on the White Tubes. Each of these scopes is examined in excruciating detail from its design to its use to its maintenance to its restoration. While I've examined and used quite a few of these telescopes over the years--they don't call me "Mr. SCT" for nothing — I learned a lot, and I do mean a *lot* here. Not only things I'd forgotten over the years, but much I never knew.

As mentioned above, this is an "E-book." That is, it is not offered in print form (though the user can print it out if desired), but instead in one of two electronic forms. Normally, it's delivered in Microsoft Word format on a DVD ROM. Being aware that many users do not yet have DVD drives on their computers, Mr. Piekier

has also made an edition available on CD ROM. This version contains the book in Adobe Acrobat (.pdf) format rather than Word. While the .pdf version is much smaller megabyte-wise, it contains exactly the same material as the DVD. The (many) pictures in the book *are* considerably clearer and better looking in the Word DVD version, however.

Any nits to pick? A few. While it is advertised as containing 1300 pages, much of the book is formatted in larger fonts, so the "actual" length is considerably less than that — a good deal less than half of the book is reformatted in 12 point type. Also, while the author's prose is usually very clear and workmanlike, it is sometimes not *quite* of professional caliber. All that means is that the book could stand a good going-over by an Editor and a Copy Editor, something I hope happens. I'd like to see *Celestron: The Early Years* published professionally in print form. It's good enough that it deserves much wider exposure and distribution than it's likely to get in its electronic form.

*How do you get it?* At this time, it's only sold directly by its author. Respond to his Astromart advertisements (just search the classifieds, Bob advertises the book frequently) or email him at [piekierr@yahoo.com](mailto:piekierr@yahoo.com).

How much? A few people have complained about the book's not inconsequential price of US\$49.95 plus US\$3.00 for domestic shipping. Yes, it's a trifle high for a CD or DVD E-book. But, come on, you've paid that much for computer games or for PC planetarium programs you never use. This book is worth every penny — in spades. You'll agree once you see the work the author has put into it. If you are an SCT fan, this is something you *will* want — no — something you *must* have, and it will provide you with many happy hours of browsing and reading.

## The Perils of Astronomy

Well, there was the time I went to a star party 2 hours from home. A friend and I hit monster thunder storms that were blowing the tarp off the open pickup with my home-made 20-inch dobsonian back there. We said, "Press onward". More storms were encountered but we felt that it would clear so we kept going.

We arrived and, amid curious onlookers, I began to act obnoxiously as I set up. "Oh year! This baby will show you sights that you have never seen! Sure I built it myself. Back up son, you'll put out your eye!" Then, as the crowd looked on, the moment transformed into a "Farside" cartoon that read like this:

"It was only after exciting the crown to a feverish pitch the Lederman realised he forgot all of his truss tubes".

- Rusty Lederman

I have a good friend with a 10-inch LX200 that was his pride and joy. About a year ago, he had his sister and her brood of three kids come up for Thanksgiving.

Unfortunately, Brad had to work while they "rested" after the trip at home. While Brad's sister slept, his 12 year-old nephew got curious about the large scope in the utility room. Brad got home, glanced in the utility room, only to see his pride and joy in about 15 pieces.

They had to drag him off the little darling...

- R. Russ



# LunarPhase Pro Software Review

By Kevin Berwick

**20:11:30 19** **Lunar Visibility**

- Daily View
- Find Lunar Eclipses
- Display Phases for Month
- Lunar Features Database
- Lunar Features Sunrise/Sunset Times
- Find Similar Illumination
- Lunar Libration
- Crescent Moon Visibility
- Apogee and Perigee
- Easter Sunday
- Equinox and Solstice Information
- Basic Lunar Data

14997 km  
12312 km

**LST: 23:56:27**

10:12 06 October 2004  
02:49 14 October 2004  
21:59 20 October 2004  
03:08 28 October 2004

**Moon**

Moonrise:	10:39	Az:	233° 59' 44"
Transit:	16:54	Alt:	36° 42' 35"
Moonset:	23:09	P.A.:	265° 38' 50"
		Ph.A.:	104° 02' 09"

**Libration**

N-S:	06° 39' 39"	E-W:	00° 44' 07"
	06° 42' 05"	In P.A.:	353° 42' 03"
Pos.Ang.:	354° 12' 44"		
CoLong.:	344° 21' 45"		

**Sim.Illum**

**Sun**

Sunrise:	05:42	Az:	257° 12' 02"
Transit:	11:45	Alt:	-35° 58' 06"
Sunset:	17:48	R.A.:	13h 39m 26s
		Dec.:	-10° 19' 45"

**Twilight**

	Start	End
Civil:	05:21	18:09
Nautical:	04:56	18:34
Astronomical:	04:32	18:58

**October 2004**

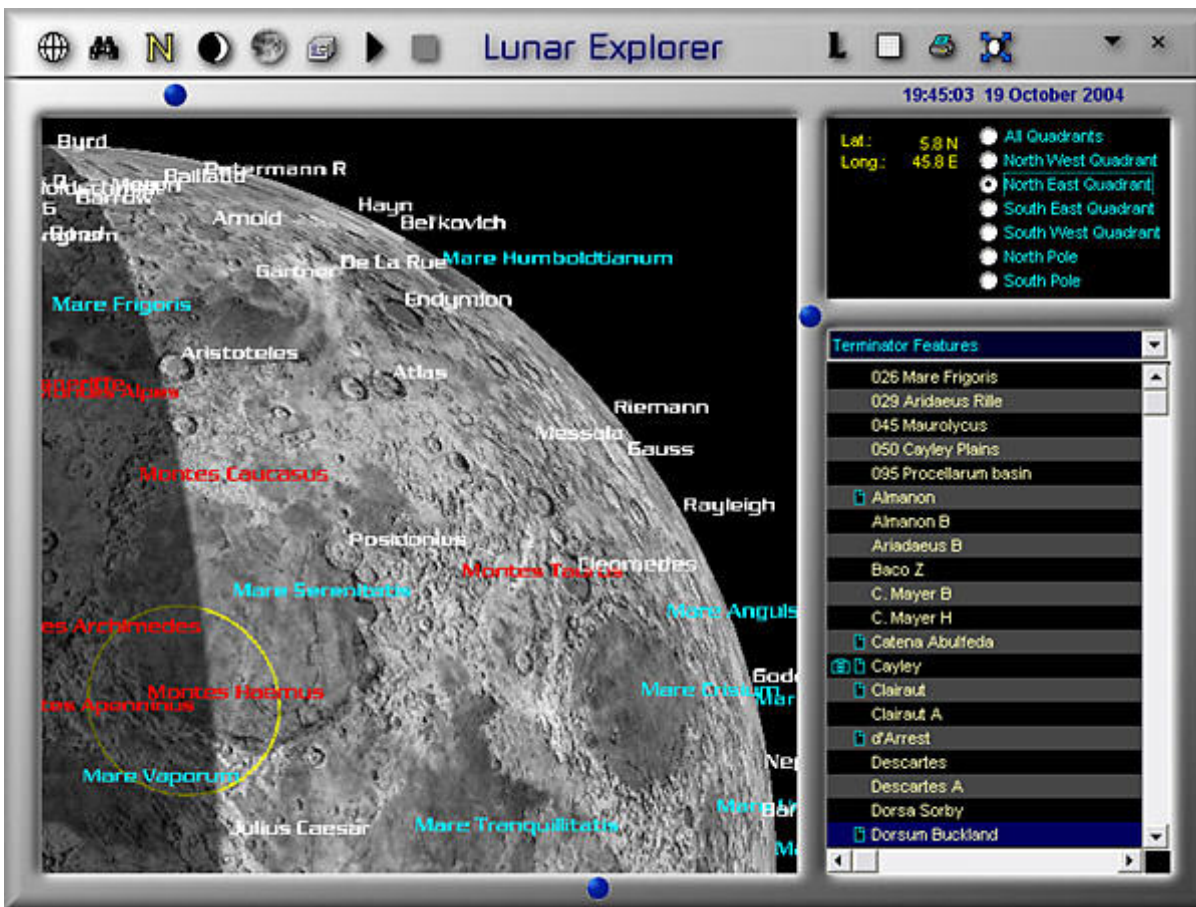
Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Since the publication of Charles Wood's 'Lunar 100', in *Sky and Telescope* I have become a very keen observer of the Moon. As you probably know, the weather in Ireland is less than ideal for astronomy, so I try and plan carefully my time under clear skies to maximise my time at the eyepiece and minimise reading in the field.

LunarPhase Pro is a utility for Windows which provides a range of information on the Moon and, to a lesser degree, the Sun, graphically displaying the current phase of the moon and lunar data, in real time. LunarPhase Pro needs about 35Mb hard disk space for its installation. The recommended minimum amount of RAM on a PC is 128Mb (this will display the Moon in medium resolution graphics) but 256Mb is required for high-resolution displays. A 500Mhz or faster PC is recommended but some screen load times on calculation-intensive screens will be slow on less-specified PCs. I obtained a review copy of the software via a download rather than getting the CD. I installed the software on a 2.8 GHz Pentium 4 PC. Installation is straightforward and finished without incident.

The initial window is clean and uncluttered. The 'skin' is chrome-like, it is impossible for the user to change this to give a more conventional Windows 'feel'. The number of buttons on the toolbar is small, however one of the buttons is entitled Display Menu of Other Functions. This gives an extensive list of other functions, all which really deserve their own icons. While this would increase the 'busyness' of the Window, I feel it would be preferable to the current situation. In general, I think that while some users might be unhappy with the non-standard appearance of the User Inter-

*Left: LunarPhase Pro's Main screen showing the list of functions available from the "Other Functions" menu.*



*The Lunar Explorer screen: zoomed map showing selected labelled features and list of terminator features. Icons beside feature name show associated observation notes and images. Dorsum Buckland is identified by the ring on the map.*

face, this departure from the standard Windows 'look' looks very high-tech.

There is a [downloadable manual](#) which is available to

you before you buy the software which I like. The file is a zip file which you extract and view using a browser. Instructions on viewing the manual are provided on the manual's download page.

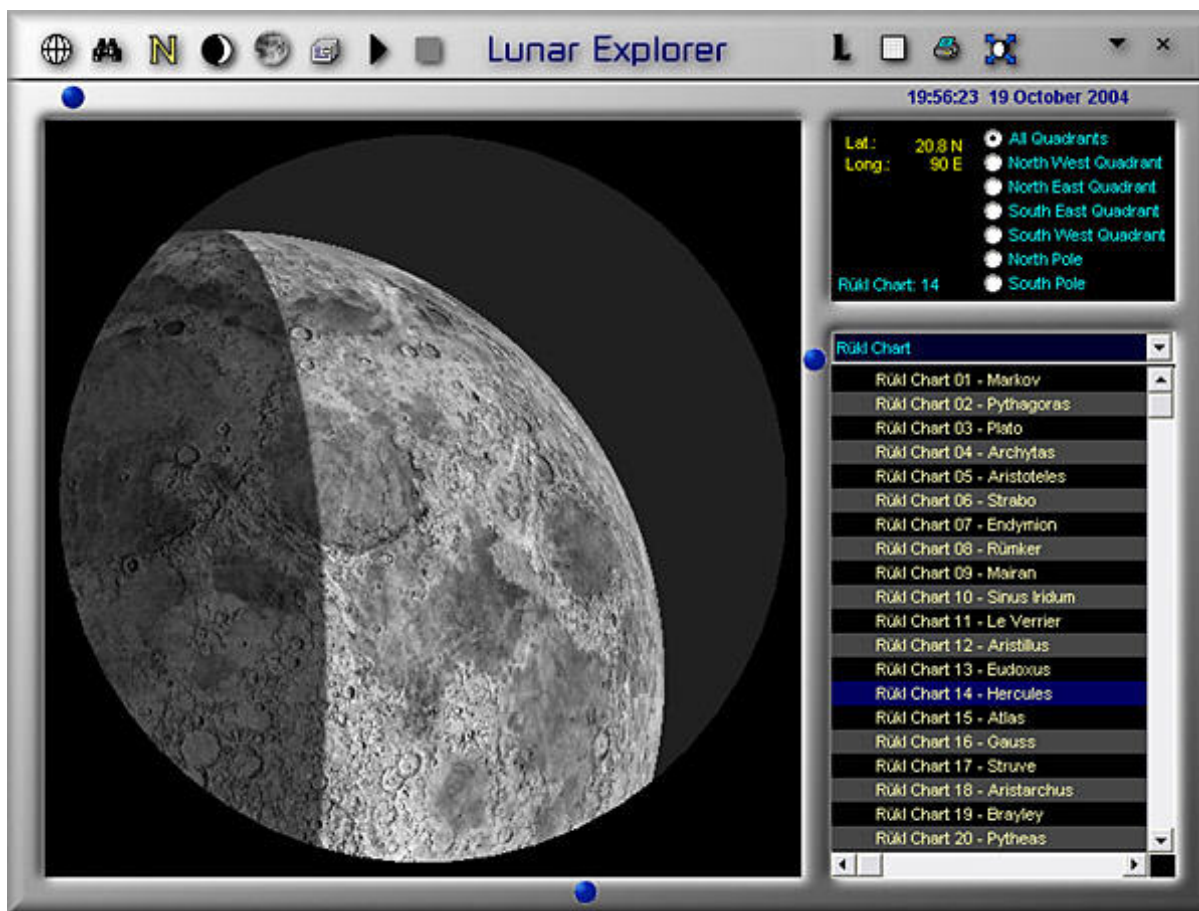
LPP is primarily a planning tool for lunar observers and offers an enormous amount of information to assist the observer in this regard. Obviously, it graphically displays the current phase of the moon in real time and displays the times and dates of the major lunar phases for the month. However, it also provides much more information for planning your next night of moon-gazing, including the real-time position of the moon in both RA/Dec and Alt/Az coordinates, a calendar of lunar phases for each day in the selected month and monthly lunar libration diagrams. It is also possible to display a Lunar visibility diagram for the month showing when the moon is above the horizon and the brightness of the Moon. In addition, the software calculates and displays Moon's Rise, Set and Transit times. If you see an interesting feature under a particular illumination condition, it is possible to find times and dates when this feature will be under similar illumination, taking into account libration effects. Far-side and North/South Polar features can also be viewed and identified.

### Lunar Explorer

Clicking the Lunar Explorer button is the gateway to the mapping functions of this software tool. If you want to take full advantage of the features here, you should activate Use OpenGL and High Resolution Graphics in the configuration screen.

The appearance of the Moon is very realistic once your PC has sufficient graphics capability to take advantage of the maps. Zooming and panning is smooth, although when you zoom in to the maximum, the image quality suffers a little.

The feature identification tool is excellent; however, when you ask the tool to identify a named feature, it places a yellow ring (the colour of which can be



*Eyepiece emulation view, in this case showing the Moon as it would be seen through an ETX 90 with a 12mm eyepiece (50° app. field of view). A list of the Rükl charts appears in the bottom right part of the screen.*

changed on the Configuration screen) around the feature which is difficult to see on the lunar surface owing to a lack of contrast, particularly on the illuminated side. Features can also be identified by clicking on the

maps; feature information appears in a window at the bottom right of the screen. It's also possible to label features on the maps with the labelling tool which lets you select which features to label and lets you set dif-

ferent label colours for different types of features. The font characteristics used can be changed as well. You can also identify lists of features, such as Charles Wood's excellent 'Lunar 100'. Over 20 different feature lists are provided.

A recent addition to the package is a Feature Search facility which lets you find all features in LPP's database that match the criteria you set; e.g. A latitude/longitude range, features only within certain sizes or only specific types of feature. Any features returned by the search can be clicked to see where they appear on the maps. Icons also show if there are any observing notes or images associated with the features and you can jump to online webpages that show satellite images of the selected feature. This is very handy for just getting lists of features within small areas on the Moon.

One very nice feature is that the software allows you to produce a high resolution animation of lunar libration showing how the moon wobbles over the course of a month. If you don't know what libration is, click this button once and all will be revealed!! It's a pity that the feature only runs for 1 month, it would be nice if it ran until the user decided to stop it. The Lunar Explorer also lists which lunar features are currently on the moon's terminator. The utility includes Rükl Chart outlines and a list of features on the chart, a feature which will become of more importance with the imminent re-issue of these charts by Sky and Telescope. Once you have entered the details of your telescope/eyepiece combination it can emulate the view through your instrument. It is possible to link images to specific lunar features and record your observations in the software in order to keep a permanent record of your observations (there are over 800 observing notes provided with LPP to get you going). Not only is a visible view of the Moon provided, you can choose to view



3 mineral maps, a gravity map and a Clementine image, a nice touch for educational purposes.

### Conclusions

Lunar Phase Pro is a great observation planning tool for lunar observers or imagers. The utility can teach you a lot about how the Moon orbits the Earth. In addition, it provides near photo-realistic views of the Lunar surface via the Lunar Explorer utility and these can be printed as custom built maps. Support for the software is excellent, there is a dedicated webpage at

<http://www.lunarphasepro.com/support>

and the author, Gary Nugent, is very responsive to requests for enhancements.

To conclude, I would highly recommend this software, a steal at only \$39.95 with five bucks off if you download rather than get the CD. I bought it!!

### Moon Rocket

Robert Goddard's early musings about building a rocket large enough to reach the moon were met with considerable skepticism. "Well, Robert," colleagues sarcastically asked when his missiles fizzled, "how goes your moongoing rocket?"

Even after his first moderate success (a liquid-fueled rocket named Nell which flew 184 feet in March 1926), many skeptics remained unconvinced. Indeed, when Goddard launched an 11-foot missile one day in 1929, the local paper covered the story beneath a cynical headline: MOON ROCKET MISSES TARGET BY 238,799 1/2 MILES.

Join the LunarPhase Pro Affiliate program and earn 33% commission on sales. All you need is a PayPal account. For more information:

<http://www.lunarphasepro.com/affiliate.html>

# LunarPhase Pro

\*\*\* New Version 2 Release \*\*\*

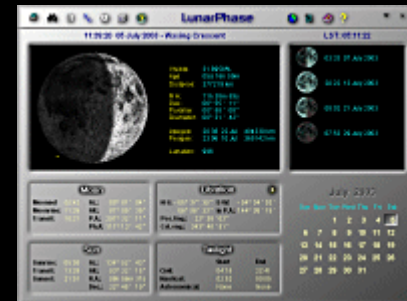
### New V2.00 Features

- Find future times and dates for when lunar features are under the same illumination
- Now over 9,200 lunar features are included in the inbuilt database, including the Lunar 100 list. Search the database using your criteria.
- Rukl Chart outlines can be overlaid on moon map
- Lists of features for each Rukl Chart can be viewed
- Emulate the view of the moon as seen through your own eyepieces
- Record your own observation notes - many features come with pre-installed notes
- Link multiple images to specific lunar features
- Different map textures can now be selected - 3 mineral, one gravity and a Clementine Near infra-red map.
- Record the positions of any properties on the Moon you've bought, see their position on the map and link to satellite photos of their regions

### Main Features

- Moon's Phase and information displayed in realtime
- Displays daily moon, sun rise/set and twilight times
- Monthly ephemeris of moon and sun rise/set times
- Maps corrected for libration. Monthly libration animation
- Identify features on maps of from dropdown lists with a simple mouse-click, by clicking on the maps directly or from user-configurable labels that can be displayed on the maps
- Lunar Explorer screen lets you identify over 9,200 features
- Optional multi-coloured map labels for easy identification
- Zoom and pan over 3D and 2D moon maps. Print out maps.
- List of terminator features updated in real time. Print out list.
- Monthly Libration diagrams for determining the best limb-features to view
- Calculates times of sunrise/set for over 9,200 lunar features
- Calculates times and circumstances of lunar eclipses
- First Crescent Visibility predictions
- Store multiple observing locations
- Maps, charts and data can be printed out
- Many more features

<http://www.lunarphasepro.com>



[gnugent@utvinternet.com](mailto:gnugent@utvinternet.com)

# Book Review

By George Reynolds

**Brother Astronomer: Adventures of a Vatican Scientist by Guy Consolmagno**  
**ISBN: 007135428X**

Many of you have read – or have a copy of – [Turn Left at Orion](#) by [Guy Consolmagno](#), an entertaining and instructive guide for amateur astronomers with small telescopes. No less entertaining is his book, *Brother Astronomer: Adventures of a Vatican Scientist*, in which Jesuit Brother Guy Consolmagno tells his life story in brief, and in more detail discusses Mars rocks, Antarctica adventures, and science/religion issues.

With grace and good humor he tells of his becoming curator of the [Vatican's collection of meteorites](#), one of the oldest collections in the world, mostly amassed in the nineteenth century by French nobleman Marquis de Mauroy. Consolmagno and his associates devised a method to determine the mass, the density, and the porosity of meteorites, which lead to theories on where meteorites come from – asteroids and other planets. He calls them his outer space “aliens” at the Vatican.

His real adventures are recounted with good-natured wit in the section titled “Wide Wild Whiteness”, a meteorite-hunting expedition with other scientists on the bottom of the world in Antarctica. He makes the vast, cold continent seem to come alive in its bleak expanse and extremes of cold and wind. The personal interaction among the small group of individuals forced to spend six weeks together in that harsh frigid environment is insightful, at times poignant and other times hilarious. Everyone on the team has a specialty, and he often wonders, “Why am I here?” They bring home a

treasure trove of 390 meteorites. It is fascinating to learn how they go to great pains to preserve the pristine condition of the space rocks. To collect them without contaminating them is a real challenge, especially under subzero temperatures, where the cold dulls the mind and freezes the fingers.

Perhaps most enlightening and enjoyable are Consolmagno’s discourses on science and religion. He reminds us that only recently, in our popular culture, has there been an apparent schism between science and religion; that indeed, the great thinkers of ages gone by were men of renown in the church, men of great religious faith. The search for truth is and always has been the goal of both good religion and good science. “God gave us brains; He expects us to use them,” he says.

“To understand why” science and religion are thought to be opposed, says Consolmagno, “we need to look not at science, nor at religion, but at the popular culture.” He explains that science in school is often a turn-off for kids, and many leave the church as teenagers, “before they are old enough to appreciate it.” The result is a childish view of both science and religion.

The popular media – news, TV, movies – present a distorted view of both science and religion as well, he contends. If there is no action, no drama, no conflict, it doesn’t make good copy or good video. Scientists are often portrayed as “mad”, and preachers are stereotyped as extremists. Fear and confusion of the roles

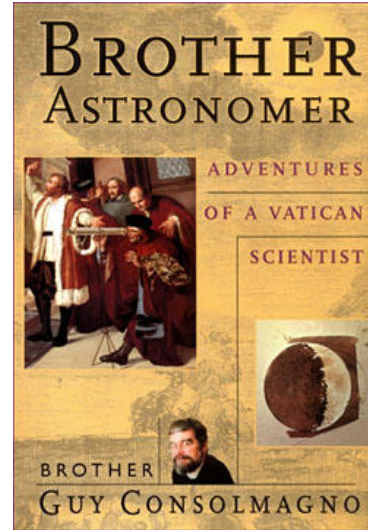
and relationships of science and faith are the result. “It’s a fundamental misconception of how both science and religion work.” He goes on to say that Christianity does not start with faith, it starts with experience; and that science does not begin with experiment or logic, it begins with intuition.

He recounts the timeworn story of Galileo and the Church, and contends that that situation was largely a matter of pride and politics, not strictly religion and science. The ill-feeling produced by Galileo’s trial set back science for years, and sparked the thinking that the church was anti-science, though the Church has since repeatedly admitted the mistakes it made there almost 400 years ago.

In his “Confession of a Vatican Scientist” section of the book, Consolmagno presents many wise arguments explaining the deep connections between science and religion. You’ll have to read it to appreciate it. He says, “Good science is a very religious act. The search for Truth is the same as the search for God.” Of the “unexplainable”, he says, “Our theology prepared science

to accept the seeming contradictions of quantum theory, for instance; just because something doesn’t seem to make sense, is no proof that it must be false.”

He sums it up by saying, “The desire for truth and understanding, including understanding the truth of the natural world, was given to us by God, in order to lead us to God. It is the desire for God. It is why I am a scientist; it is why the Vatican supports me.”



# The Dream of Robin Goodfellow

By J.M. Harvey

William Shakespeare wrote of 'A [Midsummer Night's Dream](#)' in 1595 but it was in 1781 that William Herschel discovered [Uranus](#), during a survey of stars to 8<sup>th</sup> magnitude. But it was nearly two hundred years after the Bard had first conjured their names that Herschel then found the two major satellites, [Oberon](#) and [Titania](#) in 1787. Thus, Shakespeare's King and Queen of the Fairies came to be immortalised in the sky. My literary reader will have long since spotted the connection with the title of this drivel. Robin G., alias [Puck](#), was the mischievous fairy servant of Oberon who, when urged to get a move-on, in seeking a magic potion, rashly claimed "I'll put a girdle round about the Earth in 40 minutes". Not bad going for 1595. But wait . . . just a fairy minute!

For the last thirty or so years most people will have heard of escape velocity: ever since Apollo clocked up about 25,000 miles per hour en route to the Moon. Objects travelling at less than  $0.71 \times$  escape velocity cannot achieve a stable orbit. At  $0.71 \times$  escape velocity, the orbit becomes circular, and at higher velocities the orbit becomes more and more elliptical (increasing eccentricity) until the escape velocity is reached. Technically, the orbit then becomes parabolic and off you go.

Today's satellites take about 90 minutes to orbit the Earth at a speed of about 17,000 miles per hour or thereabouts and it is clear from the above that if you try to go any faster you overcome the gravitational

acceleration of Earth and leave for outer space: no doubt shouting an Astronaut's equivalent of "Parabolical", or some such.

What this boils down to, is, that if you wish to travel at the fastest possible speed from here, to say Australia ; or even more likely, if you want to get home again ASAP, you have a problem, a speed limit imposed by Isaac Newton no less. Ignoring check in and landing etc. you will need forty something minutes flight time. (45 and you might miss and end up - or rather down - in the sea).

To cut the flight time you would have to burn fuel to hold yourself **down** in orbit and prevent a much longer and inadvertent space trip. However even here there is another limit.

How much 'G' force can you and your fellow passengers stand for the duration of the trip? Take-off acceleration and deceleration on landing, are both limiting factors and to impose a reverse load during the flight would demand some pretty fit travellers ; not to mention some wealthy ones. I fancy the fuel costs would also tend to tally up; just to save those extra minutes. Perhaps this will be the 21<sup>st</sup> century equivalent of the 'Round the World' races we witness today, when some incredibly wealthy and eccentric comedian tries to prove he is the fastest chap around. . . . . (the World that is).

Makes you wonder if he could ever match up, or catch up to Puck - Mind you Puck was *really magic*!

Take it easy -

Mick Harvey is a member of the [Cornwall Astronomy Society](#)

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<http://www.lunarvistas.com>



# HUNTING METEORITES

By Mark Bostick

There are basically two ways to build a personal meteorite collection. Purchase them from a dealer or a collector, or go out and find them yourself. Purchasing meteorites is pretty easy: a simple phone call or search of the Internet can land you a pile of meteorites, assuming you have the funds to acquire them. Finding meteorites is a little harder, but not as hard as it may seem. More people are hunting (and finding) meteorites than ever before. The fact that you are reading this shows you have some interest in meteorites and perhaps a willingness to hunt for them.

Some meteorites are quite valuable; in the last twenty years, we have identified meteorites from Mars and the Moon. Certain classifications can go for hundreds, if not thousands, of dollars per gram. Discovering one of these rare meteorites can be the equivalent to winning the lottery. Of course, most of the meteorites are common chondrites and therefore, most meteorite finds are only worth a few dollars a gram. But if you do not know how to hunt for meteorites, then none of this matters. In this article, I will cover the basics on where to look for meteorites and how to find them.

Before you start spending money on equipment and requesting your vacation time for a hunting expedition, it is important you learn a little knowledge about what meteorites look like. There is nothing better than seeing and touching meteorite hands on, so if possible check to see if there is a meteorite display in your

town. These are usually found at National History museums, science centers and observatories. Some colleges have large collections as well. Many meteorite displays have a few samples laid out that can be picked up or felt with your hands. If there is no collection locally and you do not have the time to visit one of the national collections (such as the Smithsonian and the American National History Museum), go to your local library and see what books they have to offer on the subject. Another great place to look is on the Internet through search engines. I think you will be amazed at the amount of information on meteorites that is available there. If purchasing a couple of meteorites is in your budget, I highly recommend it.

## Places To Find Meteorites

1. The best place to search for meteorites is where meteorites have already been found. Usually, when a meteor falls it will explode in the lower atmosphere sending various sized meteorites over a widespread area. This area is known as a *strewn field*. Usually, strewn fields will form in an elliptical circle. Some strewn fields have been hunted heavily and finding meteorites there can be hard if not almost impossible. Other strewn fields are easier to find meteorites in. Researching strewn fields will show you which ones give a good chance at finding something cosmic and those where you have almost no chance. As with any fieldwork, be sure to get the permission of the landowners before you start hunting in their fields.

2. Deserts. Most deserts are good hunting grounds for meteorites for a number of reasons. Most deserts lack rocks and hunting in places with few natural rocks is preferred. Meteorites, if fresh, will have a black coating we call *fusion crust*. This fusion crust will stand out among the lighter sands. Deserts are very dry, preserving meteorites longer than in most other regions. In the United States, hundreds and hundreds of meteorites have been found in the deserts in the last few years; this is the meteorite hunter's playfield. Within that same time, thousands of meteorites have been found in the African deserts. African deserts are older and have therefore had a longer accumulation time. When hunting blind, not in a strewn field, you should stay away from the desire to carry your metal detector. Lots of water and a good eye will get you the best results.

One of the better places to look in deserts is in sand blowouts. The wind does two things here. It exposes a large area of surface in a small space and it sorts the rocks by size. It blows the smaller grains of sand on top and leaves the heavier gravel towards the bottom. Many hunters have been successful hunting different blowouts.

3. Dry Lake Beds. The terrain in dry lake beds is flat making it easy to go over a large amount of space in a relatively short time. Most dry lake beds are relatively free of rocks and any meteorite that did happen to fall there isn't going anywhere. Many dry lake beds have a light surface, making any new find stick out from several yards away. One meteorite hunter I know visits dry lake beds often. He has found most of them flat enough to use a bicycle to hunt on their surface with.

4. Antarctica. Antarctica has almost everything going for it in meteorite collecting. It is pretty much flat,



*The author hunting for meteorites with a metal detector*

rocks are somewhat rare, meteorites stand out in the snow and ice fields, and the region helps to naturally preserve meteorites. Antarctica also has a natural mechanism that brings the meteorites to the surface. However, the cost of hunting meteorites in Antarctica keeps all but the government teams from going.

### Hunting Gear

While different hunters are partial to different hunting gear, there are some basics.

1. **Metal Detector.** Most meteorites will trigger a metal detector. If you have done your research, you know that most meteorites are stony masses. Even

these stony meteorites usually contain about 20% iron-nickel and plenty to make your detector go off. There are meteorites with no metal in them but these are the exception. If you do find a suspected meteorite that doesn't set off your detector, go ahead and save it for further examination later. It'll always make a rock for the rock garden and be one less rock to contend with if you plan on hunting the same area again. Most meteorite hunters use White's metal detectors. You should purchase the best metal detector within your means; I've heard many stories about hunters finding meteorites in holes dug by other people.

2. **GPS Unit.** A G.P.S. unit (Global Positioning System) will serve multiple purposes for you. If you should happen to find a meteorite, it is important that you record the exact coordinates of the find. This will help you search later for brothers of the meteorite and it is required information when submitting the meteorite for a name. The G.P.S. will also help you find your way back to the car after the long day of hunting and with experience, you can use the G.P.S. to help you search the area in a grid fashion.

3. **Rare Earth Magnets.** Magnets are a popular tool for meteorite hunting; rare earth magnets are the most powerful magnets. Some prefer to tie them to strings while others attach them to poles. When a magnet is attached to a pole we call it a *meteorite-cane*. I have a nice meteorite cane made by a fellow collector who attaches his magnets to golf canes.

4. **10x Magnifier glass or a jeweler's loupe.** If you are familiar with meteorites enough, you will have a good idea when you find one. Still, it's always a good idea to carry a magnifier glass with you for a closer inspection. Many rocks in the field will resemble meteorites, and with a nice magnifier or loupe you can get a

quick close-up look. I personally use the jeweler's eye-let. Most of these are quite affordable and some you hang it around your neck from a cord or lanyard.

**5. Rock hammer and shovel.** The most basic of all gear when going rock hunting of any kind; no geologist would go out into the field without these two items. Just remember, if you dig a hole please fill it back in. You might not be planning on hunting there again, but don't hurt someone else's chance of hunting for meteorites, or even fossils in the same region.

**6. Maps and Compass.** It's always good to have a map of the area you are going into. If you cannot afford a GPS unit, at least be sure to bring a compass.

### The Key To Success

Time in the field is your best ally. The more time you spend hunting, the more you are likely to find one (or more) meteorites. However, even more important is research. Knowing the basics of what igneous rocks look like, what the geology in the area you choose to hunt is, what meteorites look like and what common meteorite-wrongs look like. Good research and time in the field will almost guarantee your success.

### Meteorites Are Everywhere

Meteorites can be found everywhere in the world and are out there waiting for you. Using the above suggestions, however, will increase your odds. Wherever you choose to hunt, be sure to bring plenty of water and follow all local laws. Bringing a friend with you would also be a wise decision. Who knows, you might find a 200 lb meteorite and need help carrying it away. If your first few hunting forays do not bring a success, do not get discouraged. History has shown that anyone who keeps looking for meteorites will find them. Enjoy the fresh air of being outdoors and good luck hunting.

## ASTRO BLOOPERS

I have pointed the polar-alignment telescope of my Great Polaris mounting at stars other than Polaris on occasions too numerous to mention.

-Anonymous

In early printings of the celebrated science fiction novel, **Ringworld**, author Larry Niven had the Earth rotating the wrong way. Not that SF doesn't do astro-bloopers on a regular basis, but Niven not only should have known better, but got the publisher to fix things up on the next printing right away.

I once attended a talk and slide show on beginning astrophotography which featured an image prepared by taking a 1/125 second exposure of M31, followed by 45 minutes of careful guiding.

-Anonymous

An acquaintance whom I will not name was once helping his girlfriend disassemble her excellent 10.5-inch Newtonian, whose primary she had made herself. With the tube horizontal, he removed the diagonal mirror from the spider and rested it on the inside of the tube. Then he turned the tube vertical for some other part of the operation. He said that the fraction of a second between the sliding noise as the diagonal started to fall, and the crash when it struck and shattered the primary, was the longest period of his life. His girlfriend refused all desperate offers of first-rate commercial optics as a replacement. She made another one herself, out of understandable pride. I suspect his suffering was much enhanced by not being allowed to buy his way out of guilt.

-Anonymous

## Simple RSS File Generator

Want more traffic to your website? An easy way to distribute your news? Then you need an RSS news feed. To start all you need is content you want broadcast, and one RSS text file.

The Simple RSS File Generator software takes all of the hard work out of creating your own (single-channel) RSS file. All you do is create your list of headlines and get the software to create the RSS file for you which you can then upload to your website. So you never need to become an XML tech-head before you can create your own news feed.

<http://www.rssgen.com>

## LunarPhase Lite

LunarPhase Lite is a simple application that provides basic information about the Moon and Sun and is of use to photographers, fishermen, gardeners, military people and amateur astronomers.

If you don't need the advanced features of LunarPhase Pro then this simple application may suit your needs.

It contains a Daily View diagram that shows where the Moon and Sun will be during the day, overlaid on a blue band that shows morning and evening twilight and the hours of daylight. Azimuth and altitude of the two bodies are also listed.

<http://www.nightskyobserver.com/LunarPhaseLite>



# Aerial Explorations of Terrestrial Meteorite Craters

By Charles O'Dale

The Barringer Meteorite Crater is named after D. Barringer who first postulated that the feature was the result of a meteorite impact. It is classified as a [simple meteorite crater](#). Before the Barringer Crater was identified as an impact crater it was called Coon Mountain or Coon Butte. It was then called Meteor Crater after the nearest (now defunct) post office, "Meteor". Barringer had established this post office at the Sunshine flag stop on the nearby railroad. Meteorites from this fall are named "Canyon Diablo" after the canyon near where the first identified meteorite from this impact event was found.

Barringer Crater is located in central Arizona, approximately 150 km

south east of the [Grand Canyon](#). The striking feature of the crater is its geologic cross section which almost matches perfectly the geology of the Grand Canyon walls.



*Barringer Meteorite Crater from the space shuttle with the environmental effects from the meteorite impact indicated (with permission from NASA/Univ. AZ Space Imagery Center).*

Exposed at the bottom of the crater is the 260 million year old Coconino sandstone ([Permian Age](#)). Above that is the yellowish Toroweap formation, a Permian sandstone. Next is the cream coloured 250 million year old Kaibab formation sandstone. Above the Kaibab is a 10 million year unconformity (the contact between older rocks and younger sedimentary rocks in which at least some erosion has removed some of the older rocks before deposition of the younger). On the unconformity and the top layer of the

crater wall is the 240 million year old reddish brown Moenkopi sandstone illustrated in the image opposite.

This impact happened when the [Neanderthals](#) were still in Europe and Homo sapiens were just emerging and entering Europe. The North American Ice Age would not end for another 30,000 years!



*Barringer crater wall*





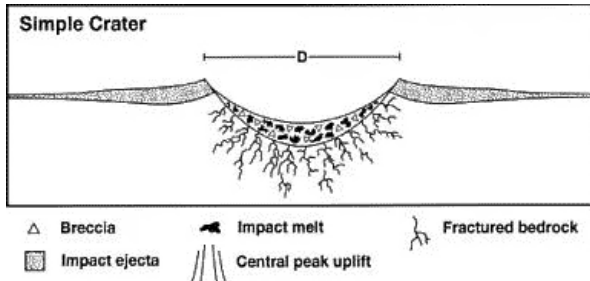
*North view*



*West view*



*South view*



We did a complete orbit of the crater to document it from each direction. Note in the following images (next page) the “square” shape of the crater, technically called a [Jointed Crater](#). This shape is determined by the faults in the geology of country rock at the impact site.

Over seventy drill holes have been completed in the rim of the crater as part of a continuing research program of impact craters by the [U.S. geological Survey](#). The drilling has shown that the overturned flap with its inverted [stratigraphy](#) is generally continuous out to about 400 m beyond the rim crest. The overturned flap



*The Barringer Crater at approximately 10km from the north and at an altitude of 4000' above ground.*

is thickest on the southern side of the crater. Correlations between drill holes show rim uplift of at least 16 m at a distance of 30 m from the crater walls.

The interpretation of the drill data suggests that relatively little erosion has occurred since the formation of the crater.



*East view*

In the final image (East view), if you look at the crater floor at the 5 O'clock position you will see a small white dot. Apparently that is the remains of a small aircraft. The pilot flew into the crater but with the tight turning radius required to stay away from the crater wall, he could not climb to exit the crater. It is a lesson in density altitude VS climb rate in steep turns. The altitude of the crater rim is over 5500 feet. The pilot and passenger survived albeit in a slightly “[bent up](#)” condition.

## Submissions

We're looking for submissions for the next and future issues, whatever part of the world you live in.

The first four issues should give you a flavor for the kind of articles we're looking for. Tell us about any astronomical trips you've been on, whether they're to local or national Star Parties or vacations based around an astronomical event such as a solar eclipse. Give us warts-and -all reviews of equipment you own, from a lowly pair of binoculars, to eyepieces to large expensive telescopes. Let us know what you think of recent books on astronomy or your appraisals of astronomy software, whether they're freeware, shareware or commercial applications; profile your club or society; tell us about any equipment you've built or modified; tell us about your experiences with astrophotography and send us some of your results. We will be paying for any material used in future issues.

Please include any photos or illustrations with your submission. You should own copyright on any photos submitted (i.e. you've taken the photos yourself) or have obtained permission from the copyright owner.

As an aid to production, it would be appreciated if material submitted was emailed to the Editorial email address (in either Word .DOC or .RTF format or as a text file). Where this is impossible, articles should be provided in hardcopy format (typed or printed) and mailed to the Editorial (snail) mail address. Submissions on floppy disk or CD can also be sent to that address.

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## Deadlines

Material for inclusion in **Photon** must be received before the following dates to ensure publication:

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# Showcase

If you have images/photos, please consider sending them in.

**Cover Image:** M27 ; Date: 06/20&21/2004; Location: Waurika, Oklahoma, USA. Telescope: LX200 Classic 10; Camera: ST-8XE/AO7. Exposure: L = 90 min. R&G = 40 min. Each; B = 60 min. RG&B Binned 2X2. Software: Capture, reduction, alignment and combination in CCDSoft. Final processing in Photoshop CS.

© Don Waid



**Left:** Lunar Eclipse montage:  
"After days of clouds and rain here in Chicagoland, I wasn't expecting to even glimpse the eclipse around here, but to my surprise the skies broke and I spotted the Moon and stars. There wasn't time to set up my LX90, computer and ToUcam for astrophotography, so I grabbed my little Meade ETX70AT refractor, a Celestron Ultima 2X Barlow and an aged Canon A-1 loaded with Kodak ASA 400. Exposures ranged from 0.5 to 6 seconds.

The film was processed at Walmart, the prints scanned at home, and the images equalized in Paint Shop Pro. The compositing was in PhotoImpression 2000.

© Tom Korzeniowski

Lib Lat -4.  
Lib Long: +2.25

# Mersenius

DISTANCE OF MOON: 399,504 km

Duration: 24 days

Longitude: 206°

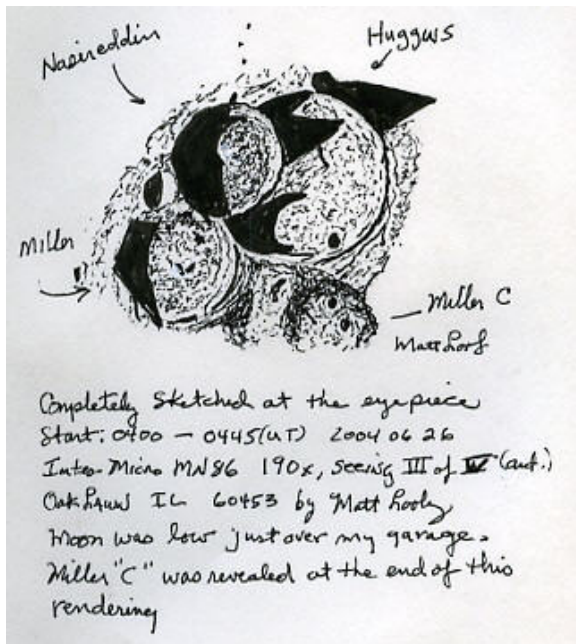
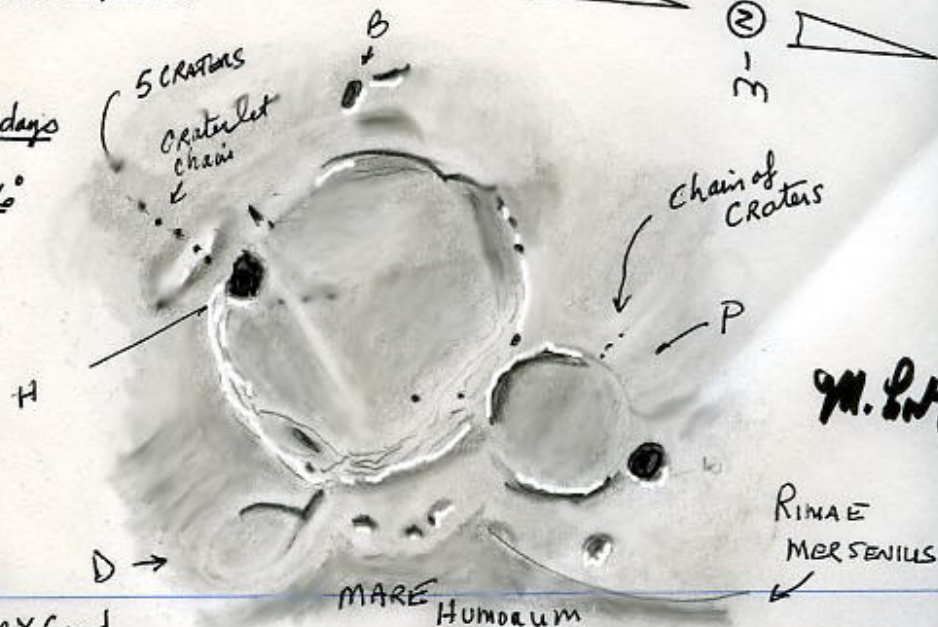
OAKLAND,  
IL

SEEING: VERY Good

DATE: 2004 08 10 1100-1200 U.T.

INSTRUMENT: 8" MAK-NEWT - MN86 w 12.5 O.P.S x 2.4 Inter Micro barlow,  
230x

THREE CRATERlets in a Row just N.E. of H.



**This page and next:** a series of four drawings showing craters Mersenius and Huggins, Mons Gruithuisen and the Harbinger Mountains.

© Matt Looby.

Mons Gruithuisen

Lematem 11 days  
 Alt: 18° over South  
 Longitude: 57.3°  
 Distance 360,300 Km

L. Lat:  $+6.11^\circ$  ↑  
L. Long:  $-2.10$

tiny  
centrioles  
/ ELAC  
(H)?

Gruithuisen

Ocean  
Procellarum  
mountain (dome)?  
center low albedo

more Gruithuisen  
CANON (DOME)

Low Albedo  
Very high Albedo  
Very Bright  
Could not make  
out any Volcano  
Pit, Too Bright

Delta

East ←

(3)

Very.  
BRIGHT

Redline

North

To MAIRAM

2004 07 29 (U.T)  
0600 - 0645 UT

Seeing: Good

$$MN86 + 12.50PS + X2 = 1927$$

Harbinger Mts  
Prinz

Incubation: 11 days  
 Altitude of Moon 19°  
 Distance: 360,331  
 Longitude 57.3°

$\Delta \text{Lat: } +6.61^\circ$   
 $\Delta \text{Long: } -2.10^\circ$

Low  
Albedo  
mixed with  
Ejecta

DARKER  
HERE

PRINZ

← View

Small SIZE  
Craters exaggerated

Van Biesbroeck

KRIEGER

Wolfsburg

Angstrom

Higher  
Albedo

MN 86

12.5 mm & Tuber  
Below

Seeing: Good

Once again the D.P.S. design revealed delicate levels of albedo on subject.





**NGC 7635** (the Bubble Nebula), captured on Oct. 23rd, 2004 with an LX200 10" telescope and a ST-10XME/AO7 CCD camera.

Exposure: L = R =  
16x10min. RG&B =  
4x10min. Each

The Bubble Nebula is actually the smallest of three bubbles surrounding massive star BD+602522, and part of gigantic bubble network S162 created with the help of other massive stars. As fast moving gas expands off BD+602522, it pushes surrounding sparse gas into a shell. The energetic starlight then ionizes the shell, causing it to glow. The Bubble Nebula is about 10 light-years across and visible with a small telescope towards the constellation of Cassiopeia.

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